

SELECTION FOR GRAMMAR SCHOOLS  
IN  
NORTHERN IRELAND

by

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## The Reform of Secondary Education

The Education Act of 1944 aimed at providing, for all pupils, "opportunities for education offering such variety of instruction and training as may be desirable in view of their different ages, abilities and aptitudes, and of the different periods for which they may be expected to remain at school".\* In 1947, a similar Act was passed for Northern Ireland, implementing the declared aim of the Government, expressed in 1944, that "no child shall be denied the type of education best suited to his needs and abilities".+ The realization of these goals required firstly, that secondary education should be reorganized to provide facilities adequate to such comprehensive demands; and secondly, that each pupil should be guided into the type of school appropriate to his "needs and abilities".

The three-fold system of secondary schools which has come to be adopted was advocated in the Spens Report and later endorsed by the Norwood Committee. It was the Norwood Committee's intention to establish Modern schools for pupils who deal "more easily with concrete facts than with ideas" Technical schools for those "whose interests and abilities lie markedly in the field

\* Education Act, 1944, section 8(b)

+ Educational Reconstruction in Northern Ireland, H.M.S.O., 1944.

of applied sciences or art", and Grammar schools for those "interested in learning for its own sake". That these categories should not be mutually exclusive is of little importance. It is probable that the Committee deliberately expressed the distinctions in general terms to avoid any suggestion of there being three rigid types of pupil. On the other hand, if courses are to be adapted to the needs and abilities of the different groups, a more specific definition is required.

There is also the assumption that three types of school are sufficient to provide adequately for the educational needs of all children. Although children differ greatly from one another as individuals, they are alike in having common qualities and needs, and there is reason to believe that the three-fold division of secondary education will satisfy the requirements of the majority of children.

#### Educational Guidance.

The reform of secondary education has been limited to courses that educational principles justify and circumstances allow us to contrive. Although the present organization may need to be revised or supplemented in the light of subsequent research, the educator is faced with the necessity of allocating pupils to the three types of schools. The aims of the Education/

Act presuppose that all pupils will be allocated to the type of school best suited to their abilities and aptitudes. Educational guidance is a duty laid down by the Act.

The first difficulty is to establish suitable standards for determining selection. Summarizing the views expressed in a "Symposium on the Selection of Pupils for Different Types of Secondary Schools", Burt\* points out that there is a general consensus that selection of pupils should be made, not simply on intellectual grounds alone ... but on as wide and comprehensive a basis as is practicable". The need for such a comprehensive basis is obvious. An allocation which depends solely on the results of the pupils' performances in scholastic examinations, or in intelligence and aptitude tests is taking no account of character and personality, of health factors, and of sociological factors, all of which may bear, to a greater or lesser extent, on the pupils' suitability for a particular type of secondary education. The difficulty here is that these qualities are not readily amenable to quantitative assessment. Some selection procedures have included subjective estimates of these qualities (as provided by personality rating-scales or school record cards) but the unreliability of such measures has weighed heavily against their becoming widely acceptable. Similarly the majority of research workers,

\* Burt, C., Brit. Journal of Educ. Psy. Vol.20,1950.



seeking quantitative measurements which yield to statistical treatment have viewed with suspicion all attempts to draw upon subjective estimates for purposes of educational guidance.

#### The Criterion of Secondary School Success.

The problem of determining the nature and scope of the selection procedure leads to a further problem - that of deciding upon a suitable criterion by which to judge the success of selection. There is widespread agreement that it is not sufficient to judge the pupil solely on his academic achievements. A pupil may have derived much greater, or, indeed, much less benefit from his secondary education than his examination marks might suggest. There are qualities of mind and character which, though not amenable to precise definition or measurement deserve to be included in the criterion. The mediocre academic record of a pupil may conceal the fact that the secondary school has contributed to the development of his powers of leadership, or his self-assurance, or his ability to persevere (assuming, for the moment, that these qualities might justifiably be expected to develop from a certain type of secondary education). Scholastic performance, then, whether assessed by school examinations, external examinations or teachers' estimates, does not tell the whole story.

Watts and Slater\* have provided a comprehensive

\* Watts, A.F. and Slater, P., "The Allocation of Primary School Leavers to Courses of Secondary Education."

summary of the objections to the use of subsequent examination performance as criterion.

1. It ignores qualities that are not easily examinable and that ought to play a part in secondary school success.
2. It assumes that school progress is mechanically determined and that variations in teaching, school environment, discipline and children's home conditions and changing interests affect achievement to an insignificant extent.
3. It assumes that the same examination results may safely be used as a measure of both secondary school instruction and of the success of allocation at eleven.
4. It fails to tell us anything about those children who just miss allocation to the school in which the examination used as a criterion is taken.
5. It has been applied to children who have been selected by a competitive examination or test whereas allocation must now have regard to all children and employ qualifying examinations or tests.
6. As used so far, it does not allow sufficiently for uncompensated brilliance in one or two subjects only; instead it favours all round mediocrity.
7. It has the unfortunate effect of seeming to



imply that the junior school curriculum must be such as to prepare children for an examination which will forecast secondary school achievement at 16 plus.

They argue that a more sensible procedure would be "to allocate children to secondary school places in accordance with their possession of the minimum qualifications for tackling successfully the kind of work recommended for them, and to review the results at 13 plus." Allocation would take account of a) general mental ability b) preliminary scholastic attainment c) special aptitudes d) capacity for sustained interest and effort.

In determining their criterion of initial suitability Watts and Slater will still be dependent on some assessment of subsequent achievement. They are seeking to discover "the minimum I.Q. levels (if any) required for taking up, with reasonable prospects of success, the various types of secondary school courses that may be provided". How can this be achieved except by studying the mental levels of those who have and those who have not undertaken the courses with success? They refer to the minimum attainment levels "needed for entry to these courses", which seems to presuppose a knowledge of successful and unsuccessful pupils. And they stress the need for tests of the special abilities "that may be needed for success in certain types of course". Once again, if they are to be able to recognize "success" they must rely on subsequent achievement. Even after

~~(on subsequent achievement. Even after)~~ they have determined the basis of allocation, they still cannot escape from subsequent achievement, for they appeal to it in their 13+ review for a verdict on the success of the allocation.

Watts and Slater appear to be primarily concerned with denigrating the use of examinations for assessing subsequent achievement(although they deny any wish to reject them utterly.) In that case one could have expected them to provide a clear formulation of some alternative method, especially since their own plan is based on subsequent achievement. On this point they offer no guidance nor do they outline the form which the 13+ review is to take. There is no guarantee that this review will not be subject to the objections which they themselves urge against the present methods of assessing secondary school success.

We are, however, indebted to Watts and Slater for rebuking those who place undue confidence in examinations as criteria, and for reminding us that it is "unsafe to accept small differences in correlations.. .. as evidence of greater or less success in secondary school allocation". They are, in fact, calling for a shift in emphasis from 'a posteriori' justification of selection procedures to a re-assessment of the abilities and aptitudes of primary school leavers with reference to their suitability for a particular type of secondary education. This is not a new approach to the

problem; indeed selection procedures were first introduced as the result of earlier research along similar though less advanced lines as those advocated by Watts and Slater. If, more recently, the follow-up type of investigation has claimed a greater say, it has been partly because the method reduced to a minimum the effect of subjective judgement and partly because it is to success in the secondary school that we must look for the justification of any selection procedure. Most of the supporters of the follow-up would readily agree with Watts and Slater that the means it employs for assessing secondary school success are far from perfect, but they would urge that that in itself lays an obligation on research workers to strive to improve them. Watts and Slater have ignored the problem by pretending that it does not exist for them, and have sought to divert attention towards initial suitability. Their failure to appreciate the importance of subsequent achievement, and the need for a careful study of the methods of assessing it, leaves their plan as one-sided as the one they wish to replace.

#### Northern Ireland Follow-up Inquiries.

Parts I and II of the present inquiry consist of 'follow-ups' whereby we attempt to assess the efficiency of a selection procedure by a criterion of secondary school success after three, and after five years. That this criterion is a limited one cannot be denied; not

only does it take account of academic performance only but it accepts examination marks as the measure of academic performance.

The most exhaustive inquiry of this type was that of McClelland\*, dealing with selection for secondary education in Scotland. Selection had been made on scores in standardized tests of intelligence and attainments, together with scaled teachers' estimates of pupils' abilities. The pupils were rated ~~as~~ regards industry and their interests were taken into account. For his criterion, McClelland used the performances of pupils in school examinations after three years at the secondary school. Although selection took place on a fairly comprehensive basis, the criterion is not above criticism. It is of a purely academic nature thus implying that "secondary school success" is equivalent to "examination success". That McClelland himself was aware of the limitations of his criterion is evident, for he points out that the criterion "should, strictly speaking, be the child's ability to profit by the secondary school course"(which, in itself, raises important questions of valuation). He goes on to add, however, that the nature of his experiment required a criterion which could be expressed in quantitative terms and for this reason he had to accept an academic one. Subsequent workers in this field, such as R.A. Peel and

\* McClelland, W. "Selection for Secondary Education."



W.G. Emmett, have carried out follow-ups following the same general lines as McClellands, and employing criteria based on scholastic achievement. As the result of the inherent weakness in the criterion the conclusions derived from such follow-ups can have a limited application only.

This is true of the present investigation. The criteria of secondary school success are the Junior and Senior Certificate results, which were accepted by the author because they provided quantitative measurements, not because they were of ultimate educational significance. Having made this choice, the author was bound to accept the limitations imposed by the academic nature of the criteria. The conclusions refer to the efficiency with which the selection procedure predicts academic success in the grammar school as defined by the certificate examinations. This is merely part of the wider question of whether or not the pupils most likely to benefit from a grammar school education are being directed to that type of school; but on this issue the author cannot pass judgment.

It might be urged that, even when limited to academic success, the conclusions are not reliable. Examinations, as instruments for measuring academic

success are far from perfect. A pupil's performance will depend on his temperament, on his form on the day of the examination, and, to some extent, on chance (in so far as any examination samples only some of the pupils' abilities). Furthermore, even external examinations such as Junior and Senior Certificate may be unreliable because of lack of objectivity in marking.

The author has sought to avoid the first source of error by dealing with large numbers of children. The effect of fluctuations on the part of the candidates, and of chance are thereby minimised. That the marking suffers from lack of objectivity cannot be denied (although there may be attendant virtues in it). This is unavoidable in an examination which involves essay-type answers. It should be added that, in the examinations under consideration, every precaution had been taken to make the marking as reliable as possible.

#### Selection for Secondary Education in Northern Ireland.

We turn now to the selection procedure in Northern Ireland. It is immediately evident that it constitutes a considerable departure from the "comprehensive basis" of selection advocated by Burt.\* The Qualifying Examination consisted of tests of intelligence and attainments, and candidates were admitted to grammar schools on their combined attainments scores, the I.Q. being ignored except to decide the fate of 'border-line'

\* Burt, C., op. cit.



candidates. Selection, then, was based on academic performance, no account being taken of temperament and character, (using those terms in their widest significance,) nor of health and social factors all of which are inextricably involved in a child's ability to profit by a grammar school education.

According to the Advisory Council's First Report,+ "The Qualifying examination was designed to measure general suitability for an academic secondary education and therefore to assess innate powers and general skills more than specific acquired knowledge". This definition suffers from the use of vague terms. The "innate powers and general skills" measured by the Qualifying examination are of a purely intellectual nature. Whether a selection procedure on these lines does, in fact, measure "general suitability for an academic secondary education" depends on what is meant by "general suitability", but it appears to derive from the assumption that intellectual factors alone correlate with success in the grammar school.

Later in the same Report (page 22), the Advisory Council seem to recognise the weakness of the present method of selection. They point out that "the time is not yet ripe for the inclusion of supplementary data such as (a) ratings of personality traits (e.g. - industriousness) by primary school teachers (b) assessments of home conditions, parental support, and the

+ "Selection of Pupils for Secondary School" First Report, H.M.S.O. 1951.

like, and (c) the results of personal interviews". They recommend that research into the reliability and validity of such supplementary data should continue, and that teachers should receive instruction and practice in the methods of making character assessments with a view to including such supplementary data on some future occasion.

To sum up, then, the results provided by the follow-ups of Parts I and II of this investigation suffer from the fact that both the selection procedure and the criterion are solely of an academic nature. The Qualifying examination, in failing to take into consideration factors other than ability and attainment, is not sufficiently comprehensive to be a completely satisfactory instrument for educational guidance. Nor are we able to make a fair assessment of the success in selecting those pupils most likely to benefit from a grammar school education since the criteria deal with scholastic performance only.

#### Scope of the Follow-ups in the Present Inquiry.

In the light of what has been said of the weakness in the selection procedure and the criterion, we may now examine the results of the present inquiry. Within certain limits the findings may be viewed with confidence. We must regard the aim of the Qualifying examination as being the selection of those pupils who have the intellectual ability to succeed at the

grammar school, where this academic success is equivalent to success in Junior or Senior Certificate. To determine its efficiency in doing this is certainly a step in the right direction, although it leaves untouched other important aspects of educational guidance. By using success in the Certificate examinations as criteria, we have accepted a one-sided interpretation of the pupil's ability to profit from his secondary education, but it is well to bear in mind that the possession of a Certificate is frequently regarded, rightly or wrongly, as the measure of grammar school success by universities, by the business world, and, indeed, by many teachers and parents. Furthermore, as McClelland has pointed out, "the pupil who consistently scores low marks in his secondary school examinations has much on the debit side of his 'ability to profit' account, no matter how much he has on the credit side in the way of response to cultural stimulus and social contacts".\*

#### The Findings of Parts I and II.

The first objective of the present investigation was to determine the efficiency of the Qualifying examination in predicting later success in the Certificate examinations. Taking the Junior Certificate first, it was found that, for the most part, the

\* McClelland, W., op. cit.

prediction was satisfactory. Of the ten Junior Certificate subjects which were included in the battery, all except Drawing were being predicted by one or more of the Qualifying tests. The relative value of the four tests in the predicting battery showed English Language to be of major importance in predicting success in the Junior Certificate language subjects, while Arithmetic gave the best prediction of the mathematical subjects. The Intelligence Test took part in the prediction of linguistic and mathematical subjects, but the predictive value of English Composition was relatively low.

In Part II where a parallel procedure was adopted using Senior Certificate as criterion, similar results were obtained. The prediction of success was satisfactory except for Geography and Domestic Science. The relative importance of the individual predicting tests was much the same as in Part I, although for girls, English Composition seemed to play a more prominent role.

A factorial analysis of each set of data was undertaken to determine whether the factors involved in answering the Certificate papers were also being measured at the Qualifying level. This proved to be so for Junior Certificate (boys) but there was a factor present in Junior Certificate Geography (girls) which did not enter into any of the Qualifying examinations tests. At the Senior Certificate level, the boys'



results provided no grounds for concern, but the answering of the Geography and Domestic Science papers (girls) involved mental abilities which were not measured in the Qualifying examination.

Parts I and II, then, have provided findings which are mostly of a confirmatory nature giving scientific support to what common sense would have led us to expect; intuitive opinion has been replaced by judgment based on scientific evidence. Where the results do conflict with general expectations further consideration is required. There are grounds for doubting the value of an English Composition paper in a selection battery which also includes English Language. (English Composition has since been replaced by a second English Language paper containing some questions which require essay-type answers.) Again, if it is accepted that the Qualifying examination should predict Certificate success in Drawing, Geography and Domestic Science, then further tests or sub-tests should be included in the selecting battery to assess the abilities involved in these subjects. Perhaps the most obvious feature of the results, however, has been the efficiency with which the Intelligence Test predicts Certificate performance. To many educationists this would merely confirm expectations but those responsible for selection in Northern Ireland were dubious of the value of the Intelligence Test. At any rate the I.Q. was ignored

except in the case of candidates whose total attainment scores were in the 'borderline' zone. The findings of Parts I and II are overwhelmingly in favour of using the I.Q's of all candidates in making the selection.

### The Findings of Part III.

In Part III, which is quite distinct from the follow-ups of Parts I and II, the results of the 1954 Qualifying examination were studied in detail. A large number of candidates were grouped according to sex, and according to the location and nature of the primary school which they attended. The author had hoped that, by comparing the performances of the groups, he would be able to determine whether any of the groups was at a disadvantage in the Qualifying examination. It was his intention to seek answers to such questions: as:- Does the Qualifying examination favour boys more than girls, or vice versa? Does the child from a country school have as good a chance of being admitted to a grammar school as a child from a town school? Are the educational facilities provided by voluntary schools inferior to those of the country i.e. state-controlled schools? Unfortunately, the nature of the data was such that it was impossible to investigate these problems and the aim of this part of the inquiry had to be modified. The main difficulty was that the candidates who sat the Qualifying examination constituted



a selected group since they had been entered on the advice of their teachers or at the request of their parents. At first sight it appeared that the effect of this preliminary selection might be removed statistically, but this turned out to be impossible.

Part III, therefore, has yielded results which are not so far-reaching as had originally been expected. Nevertheless, the performances of different groups of pupils did show considerable differences. It was found that there were wide variations in the mean I.Q. and in the mean attainments scores in different Education Authorities, which show that the standards used for selecting entrants for the Qualifying examination are by no means constant; and these results suggest the possibility that the intellectual level of the pupils varies from one Authority to another. The study of sex-differences was more reassuring. Although the boys displayed marked superiority in Arithmetic, the girls were far superior in English 2, the mean scores in the remaining two tests being almost the same. Urban children, however, had higher mean scores than rural children in all Qualifying tests, and the mean scores of candidates from county schools were higher than those from voluntary schools. These results may be due to the influence of selection; but it is also possible that the differences have resulted from differences in the intellectual abilities of the pupils, or from differences in the

efficiency of the teaching. No definite conclusions on these matters can be expressed in this thesis, but there is an obvious need for further investigation of these problems.

#### Some Suggestions for Further Research.

It is probably true to say that no research work is ever complete in itself. During the course of an investigation questions arise which, though not falling directly within the scope of the investigation itself deserve consideration in their own right. One of the most obvious questions suggested by the results of the present inquiry concerns sex-differences. On several occasions in Parts I and II it was found that the results for boys conflicted with the results for girls. Unless boys and girls are to be selected separately, it is important to ensure that the Qualifying examination is equally suited to both sexes. By studying the performances of comparable groups of boys and girls, it should be possible to decide whether this is so.

Concern has also been expressed at the poor prediction of Geography, Drawing and Domestic Science. Further research is needed to confirm whether special abilities are involved here, and, if so, to determine their nature and devise tests capable of measuring them and suitable for inclusion in the Qualifying examination.

Again, it was noted that, for boys, performance in Qualifying examination Arithmetic gave a reliable

prediction of later success in Latin and French. This is the more remarkable since the selecting battery included tests of verbal ability, which seems at first sight to be more closely related to Latin and French than the mathematical ability measured by the Arithmetic test. Perhaps our results have been distorted by influences which are not immediately obvious (such as, say, subjective marking of the language papers) but at all events a more detailed investigation is called for.

The most fertile source of suggestions for further research, however, may well prove to be Part III. The findings here have all been affected by the preliminary selection of the candidates. Each of the problems studied in Part III requires further examination based on data drawn from a representative sample of the primary school population. As our results stand, they suggest the possibility of injustice being done to certain groups of candidates. Although this is no more than a possibility, so much depends on the results of the Qualifying examination that the position must be clarified by further research.

Throughout this thesis selection has referred to allocation to grammar schools. Allocation should be made to all three types of secondary schools but this will involve research into the abilities and aptitudes necessary for success in these schools, and the

development of procedures by which to make such allocations on as comprehensive a basis as possible. A clear formulation of the nature of success in each type of secondary school is required, and research must proceed to determine how these criteria can best be assessed, whether they should be measured quantitatively or qualitatively, and at what stage in the secondary course they should be applied. These questions in turn presuppose a careful definition of the aims of secondary education. If it appears that the author has neglected these fundamental issues it has been because the scope of the inquiry was limited and the problems raised by it were of a more specific nature.

INTRODUCTION.(1) Historical Background.

Before 1948, grammar schools in Northern Ireland drew their pupils from those families who could afford to pay the fees. The child from a poorer home was denied a secondary education unless he managed to win a scholarship. Many grammar schools offered a small number of private scholarships, and, in addition, the Ministry of Education and the local Education Authorities conducted a Scholarship Examination each year. This Examination was in English and Arithmetic, and although 50 per cent was the pass mark, the number of successful candidates far exceeded the number of scholarships available, so awards were made on the order of merit, a means test being taken into consideration. In 1947, over 2,700 candidates out of a year group of approximately 22,000, entered for the Scholarship Examination. Of these, approximately 1,500 reached the 50 per cent standard, but only 609 were awarded scholarships.

The 1947 Education Act laid down that in future admission to grammar schools was to depend on a Qualifying Examination administered by the Ministry of Education. This examination would be open to all primary pupils who wished to proceed to grammar schools, the means test would be abolished, and the parents of successful candidates would be relieved of all financial outlay.



(2) Admission to Grammar Schools.

The first Qualifying Examination was held in the spring of 1948, and approximately 13,000 pupils entered for it. The majority of the candidates were aged from 11:0 to 13:0 on 1st June 1948, although some younger pupils were allowed to sit. The upper age limit was fixed at 13:0 in order to give those pupils who would normally have entered for the Scholarship Examination a chance to qualify, though it was intended to reduce gradually this limit to 12:0. At present (1955) the upper age limit stands at 12:3 where it has remained for the past few years.

The 1948 Examination consisted of a Moray House Intelligence Test and locally constructed tests in English Composition, English Language and Arithmetic. Scores on these three attainments tests were scaled on the English Language marks to give a weighting of 1:2:2. The scaled marks were totalled, and candidates with aggregates above 50 per cent were declared 'qualified'. The I.Q.s were used to discriminate among the borderline pupils i.e. those with aggregates of 40 - 50 per cent. In all, over 5,000 pupils, out of a total of some 13,000 candidates, were admitted to grammar schools on the results of the Examination.

Successful candidates were permitted to state their choice of grammar school, and these preferences were respected except where the demand exceeded the number of places available. The grammar schools were required to reserve 80 per cent of their places for qualified/



pupils, the remaining places going to fee-paying pupils who had either failed, or not entered for the Qualifying Examination. In practice, some country schools found that only 50 per cent of their places were required for 'qualified' pupils while some of the fashionable city schools accepted over 90 per cent.

Since 1948, the Qualifying Examination has undergone certain minor modifications. The English Composition paper as such has disappeared, but in its place is another English paper demanding essay-type answers. The remaining attainments tests have been somewhat simplified. The system of weighting has been changed (the combined English marks are now weighted to Arithmetic in the ratio of 3:2 ) and the pass mark increased to 60 per cent. The essential structure of the examination remains unchanged and selection for grammar schools takes place along the same general lines as it did in 1948.

(3) Research.

The Ministry of Education has carried out a considerable amount of research on the Qualifying Examination.\* Using the 1948 results, the performances of candidates already enrolled in the preparatory departments of grammar schools were compared with those of primary school children. It was found that although the preparatory school group had the higher mean I.Q. the proportion who passed was smaller than for primary school pupils. This was accounted for by differences in schooling.

The role of the Intelligence Test has been studied. If I.Q. alone had been used as the basis of selection, about 80 per cent of the pupils who qualified in 1948 would have been admitted to grammar schools. It was also suggested that one or two Intelligence Tests might be used for a first screening, qualifying all pupils with an I.Q. of 120 or higher, and rejecting all with an I.Q. of less than 95. The candidates falling between these limits would then go forward for the examination in English and Arithmetic. It was shown that in only 3 per cent of the cases would the results of this screening process have been at variance with the actual results in the full Qualifying Examination.

Another research project was based on reports from 56 grammar schools on the performance, during their first year, of pupils who had sat the 1948 Qualifying Examination. In 13 per cent of the cases, the grammar schools/

\* First Report on "Selection of Pupils for Secondary Schools". H.M.S.O. 1951.

disagreed with the verdict of the Examination; 3 per cent were 'qualified' pupils who were stated to be making poor progress, and 10 per cent were 'non-qualified' pupils who were stated to be doing well. The Advisory Council for Education suggest that these figures are over-estimates and point out that an experimental 13+ review examination conducted by the Belfast Education Authority in 1950 showed the number of 'misfits' to be much fewer. This latter examination made use of standardized Intelligence English and Arithmetic Tests and was given to 196 pupils stated by the headmasters to have been wrongly placed. On the results of the review examination 34 pupils were promoted to grammar schools and 42 were recommended to change from grammar schools to intermediate schools. In this event, less than 40 per cent of the pupils considered by the headmasters to have been wrongly placed, justified this opinion by examination.

A detailed clinical study has been carried out on 135 children whose attainment marks (in 1948 and 1949 Qualifying Examinations) fell far below the teachers' estimates. No definite conclusions emerged from this survey, but it did seem that the teachers' estimates were based on false conceptions of the character of the grammar school and the type of pupils suited for it.

A more recent report<sup>\*</sup> of the Advisory Council for Education contains the results of a follow-up inquiry of pupils who sat the 1948 Qualifying Examination and (a) 1951 Junior Certificate (b) 1953 Senior Certificate.

\* Second Report on "Selection of Pupils for Secondary Schools." H.M.S.O. 1955.

This inquiry dealt with the predictive value of the Qualifying Examination using as criteria (a) the total of marks on several Junior Certificate subjects (b) the total of marks on several Senior Certificate subjects. It concluded that the 1948 Qualifying Examination compared favourably with similar selection procedures used elsewhere, but stressed the necessity of "review examinations" at 12+ and 13+. Furthermore it recommended making use of I.Q.s in selecting pupils, and pointed out the relative inefficiency of the English Composition paper in predicting grammar school success.

Another investigation has compared the performances of town and country children in the Qualifying Examination in 1951. The scores of 191 children from small country schools were paired off against the scores of 191 Belfast pupils, each child being matched as regards age, sex and I.Q. The town children showed a superiority in English, but the country children had superior scores in Arithmetic. There was no difference in the total attainment mark of the two groups. The report of this inquiry also stressed the need for further study of sex differences in performances in the Qualifying Examination.

The attainments tests used in Northern Ireland have been compared with standardized tests in English and Arithmetic. The investigations expressed satisfaction with the Arithmetic test at present in use, but were somewhat/



guarded in their opinion of the English papers. They did not recommend, however, that the latter should be replaced by standardised English tests.

(4) Object and Scope of the Present Investigation

This investigation falls into three parts:-

Part I : A follow-up inquiry of the 1948 Qualifying Examination using the 1951 Junior Certificate as criterion.

Part II : A follow-up inquiry of the 1948 Qualifying Examination using the 1953 Senior Certificate as criterion.

Part III: A study of the relative performance of different groups of pupils in the 1954 Qualifying Examination.

Parts I and II deal with the question: Does the Qualifying Examination select the pupils who are best fitted for grammar schools? Success in the grammar school is being measured by the Certificate Examinations. The limitations imposed by an academic criterion of this nature are obvious. The results of the inquiry will reflect solely the claims of the Qualifying Examination to predict later academic success. Apart from this main objective, Parts I and II also yield some additional facts about the examinations themselves.

The general problems treated here are the same as in the Advisory Council's follow-ups, but they are here examined in greater detail. The Council was dealing with the prediction of Junior and Senior Certificate as represented by the pupils' totals formed from their six highest scores in each examination. The present inquiry deals not only with the prediction of Certificate results as a whole, but also with the prediction of individual Certificate subjects. Certain/

Certain tests were accepted as forming the criterion in each part, and the pupils' scores in each of these variables were included in the survey. Finer discriminations were made possible by treating boys and girls separately. Furthermore factorial analyses have been carried out by the author to confirm the findings of the follow-ups proper.

Part III is devoted to sociological considerations. The Qualifying Examination with its far - reaching consequences is bound to arouse fears and suspicions among parents and teachers. With this in view, the performances of pupils from different types of schools have been studied to discover the presence of any inequalities.

Throughout the inquiry, statistical techniques have been applied to large numbers of pupils to investigate any general trends which are significant in the examination scores. The study of individual cases does not fall within the compass of this investigation.

PART I

FOLLOW-UP INQUIRY OF 1948 QUALIFYING EXAMINATION USING  
1951 JUNIOR CERTIFICATE AS CRITERION.



(1) Object and Scope

The Qualifying Examination is used to select those pupils who are best fitted, intellectually and scholastically, for a grammar school education. The value of this form of selection must be measured against some criterion in the grammar school which measures scholastic success. In this part of the investigation, the Junior Certificate examination taken after 3 years is used as criterion. The main objective is to determine how far the Qualifying Examination predicts success in Junior Certificate.

As a secondary consideration, a factorial analysis of both examinations has been carried out, with the aim of revealing the mental abilities required in answering the examination papers. This analysis not only contributes to the question of prediction but also throws further light on the examinations involved.

(2) The Predicting Battery:

In 1948, 13,201 candidates entered for the Qualifying Examination (hereafter referred to as Q.E.) which consisted of a Moray House Intelligence Test and three attainments tests. These candidates were entered for Q.E. either on the recommendation of their teachers, or in accordance with their parents' wishes.

The Intelligence Test, taken on 19th March, had been standardised on almost 54,000 English 11+ school children to a mean of 100 I.Q. and a standard deviation of 15. Although all Q.E. candidates sat this test, the results were used only in the selection of border-line cases.

Four weeks later the candidates sat the remaining tests in English Composition, English Language, and Arithmetic. Table 1. gives the time and total marks for each test.

TABLE 1.: Attainments Tests in 1948 Q.E.

Test	Time	Total Marks
English Composition	1 hour	100
English Language	$1\frac{1}{4}$ hours	200
Arithmetic	$1\frac{1}{2}$ hours	200

These were examinations of the 'traditional' type, set and marked by officials of the Ministry of Education, and every precaution was taken to reduce the subjective element in marking. The scores were scaled to weight English Composition, English Language and Arithmetic in the proportion of 1:2:2.

Since the candidates ranged in age from 10: 6 (and in some cases less) to 13: 0 on 1st June, it was essential that a system of age allowances should be introduced. A statistical survey of the totals on the three attainments tests for each month group showed that  $4\frac{1}{2}$  points per month was a suitable allowance. The 11+ and 12+ groups were treated as parallels for the purposes of age allowances (e.g. a child of 11: 4 and a child of 12: 4 both received 32 points), and pupils below 11: 0 received no allowances since it was held that they would be able to sit the examination in the following year.

Selection was based on the candidates' total attainments score plus the age allowance. Those with more than 250 marks were accepted for grammar schools and those with less than 200 were rejected. Candidates with totals between 200 and 250 formed the border-line group for which the I.Q. was the deciding factor. Of the 13,201 candidates, 5,041 were admitted to grammar schools.

### (3) The Criterion

The Junior Certificate Examination (hereafter referred to as J.C.) is taken at the end of the third or fourth year at a grammar school. By 1951, many pupils who had passed the 1948 Q.E. had reached J.C. level, which thus afforded the earliest opportunity of assessing by means of an external examination the progress of 'qualified' pupils. Furthermore, a considerable number of 'non-qualified' pupils who had elected to go to grammar schools as fee-paying pupils also sat J.C. in 1951; they, too, came within the scope of the inquiry.

The J.C. examination is administered by the Ministry of Education. Papers are set in sixteen subjects, and the pupils are permitted a certain freedom of choice within the limits of the examination. All candidates must sit at least six subjects, English and Arithmetic being compulsory. One language other than English must be included, and either History or Geography. Candidates must also take either Algebra and Geometry; one of these may be replaced by any of the remaining subjects in the examination.

The maximum is 400 marks for each subject, 40 per cent being the pass level. To obtain a Certificate, a candidate must pass in at least 6 subjects, but a system of compensation operates provided that the aggregate is not less than 40 per cent of the overall total.

In/



In 1951, 4,153 grammar school pupils were entered for J.C. of whom 3,445 were successful.

(4) The Sample.

The scores of 2,956 pupils who had taken the 1948 Q.E. and the 1951 J.C. were paired off. All candidates had sat the four Qualifying tests but there was considerable variety in the subjects taken in J.C. Some pupils had entered for as many as eleven or even twelve subjects while others had been content with the minimum of six.

It was desirable to draw as wide a net as possible, bringing the greatest number of J.C. subjects within the scope of the inquiry. At the same time it was necessary from a statistical point of view that the number of candidates with scores in these subjects should be large enough to allow the results to be accepted with confidence. The effect of small numbers is to increase the element of random error thus detracting from the reliability of the results.

After a preliminary survey it was found that both claims could be met by accepting ten subjects in J.C., viz.

English, Latin, French, History, Geography, Arithmetic, Algebra, Geometry, Experimental Science and Drawing.

A group of 479 candidates (338 boys and 141 girls) had taken all ten subjects. These were drawn from schools throughout the province, irrespective of Education Authority, or of the nature of the school or its location. These candidates, then, constituted the sample.

As/

As it was intended to treat the sexes separately throughout this part of the investigation, separate score sheets were compiled for boys and for girls, listing the scores for each candidate in the four Q.E. tests and in the ten J.C. subjects. These scores were punched on Hollerith cards by the Scientific Computing Service which provided sums of scores, sums of products and sums of squares.

(5) Means and Standard Deviations in Sample.

From the results of the calculations carried out by the computing agency, means and standard deviations (Table 2) were calculated for all variables.

TABLE 2. : Means and Standard Deviations in Sample.

Examination Subject	Code letter	BOYS (N = 338)		GIRLS (N = 141)		
		Mean	S.d.	Mean	S.d.	
1948 Q.E.	Intelligence Test (I.Q.)	x <sub>1</sub>	114.13	10.10	116.01	10.66
	English Composition	x <sub>2</sub>	52.57	15.56	55.82	14.93
	English Language	x <sub>3</sub>	120.13	28.19	120.82	26.75
	Arithmetic	x <sub>4</sub>	124.30	37.92	109.22	37.05
1951 J.C.	English	y <sub>1</sub>	229.73	46.68	243.48	41.85
	Latin	y <sub>2</sub>	165.56	76.55	197.45	74.39
	French	y <sub>3</sub>	202.40	72.85	226.95	59.56
	History	y <sub>4</sub>	193.73	61.23	207.80	64.89
	Geography	y <sub>5</sub>	208.58	52.78	208.23	62.05
	Arithmetic	y <sub>6</sub>	244.41	61.94	242.55	57.78
	Algebra	y <sub>7</sub>	255.41	72.32	261.06	65.71
	Geometry	y <sub>8</sub>	225.86	70.51	222.77	65.40
	Science	y <sub>9</sub>	195.38	63.64	190.85	57.38
	Drawing	y <sub>10</sub>	197.69	49.92	186.67	46.36

Strictly speaking, one is not justified in comparing the sexes. The samples from which the statistics/



have been derived are selected samples, and it may be that boys and girls have not been selected according to the same standards. In entering pupils for Q.E., teachers may use different standards to assess the ability of boys and girls; and parents may not press the claims of their sons and daughters equally. Any comparison of the sexes, therefore, must be treated with caution.

Bearing this reservation in mind, Table 2 shows the girls to be superior to the boys in I.Q. and in both English tests, but the boys are superior in Arithmetic. In 1951 Q.E., similar results were obtained for a sample of almost 400 pupils.<sup>x</sup> Similar sex differences have been found elsewhere. An inquiry<sup>+</sup> carried out in 1953 on approximately 20,000 West Riding pupils showed the girls to be superior to boys on each of two Moray House English tests, and a similar trend was observed for a smaller number of cases on two Moray House Intelligence Tests. The results for the two Moray House Arithmetic tests, however, showed the mean scores to be almost the same.

The linguistic superiority of the girls persists at the J.C. level. Their mean scores are higher than the boys' in English, Latin and French. In the mathematical subjects, the superiority of the boys is not so pronounced as it was in Q.E., and in Algebra the girls are now ahead of the boys. Boys/

<sup>x</sup> Second Report, op.cit., H.M.S.O.1955.

<sup>+</sup> Emmett, W.G., and Wilmut, F.S., "Prediction of School Certificate Performance in Specific Subjects." Brit. J. Educ.Psy. Vol.XXII, Part 1, 1952.

Boys are superior in Science and Drawing.

It is interesting to note that the highest mean scores for both sexes are in the so-called "basic" subjects viz. English, Arithmetic, Algebra and Geometry. It is highly probable that these subjects are marked more leniently than the others because they are compulsory. The mean score of 165.56 (which is just over the 40 per cent pass mark) reflects perhaps the schoolboy's reputed distaste for Latin!

The standard deviations in Table 2 show that the boys' scores are more widely scattered than the girls', except in the Intelligence Test in Q.E., and in J.C. History and Geography. The standard deviations of the Q.E. tests accord with the figures for a similar sample of 478 boys and girls quoted in the Advisory Council's Report. The influence of selection is evident in the Intelligence Test which had originally been scaled to a standard deviation of 15; this figure has been reduced to 10.1 and 10.7 for the samples.

The most disturbing features of these results, however, are the wide variations in standard deviation among the J.C. subjects. They range, for boys, from 76.5 (Latin) to 46.7 (English), and, for girls, from 74.4 (Latin) to 41.8 (English.) Nor are these variations due to sampling error for the standard deviations in the population (§ 9 Tables 10,11) also show wide/

variations. The unequal weights carried by the J.C. subjects invalidate the use of aggregates, yet aggregates were in fact used in awarding Certificates (§ 2). Furthermore, the standard of 40 per cent varies from subject to subject according to the mean and standard deviation of each. It is evident, then, that a scaling procedure should be introduced whereby the means and standard deviations of all subjects could be equalised.

(6) Correlations in Sample.

From the results of the calculations carried out by the computing agency, the intercorrelations, 91 in number for each sex, were calculated. (See Tables 3 & 4)

The intercorrelations of the Q.E. variables are higher for boys than for girls (except for  $r_{x_1x_2}$ ) but the order of magnitude is almost the same. These figures agree closely with the Advisory Council's results.\*

Greater differences between the sexes are apparent among the intercorrelations of the J.C. subjects, but for the most part the results agree with expectations. Each verbal subject correlates more highly with other verbal subjects than with mathematical ones, while the latter give high correlations with one another, especially in the case of the boys. The Science paper, which demands mathematical ability and clarity of verbal expression, is found to correlate with maths. and languages, but History and Geography, which are mainly verbal subjects, correlate better with languages than with maths. Drawing alone has low correlations throughout (except for a rather astonishing result of .412 with Latin in the girls' data.)

The intercorrelations of Q.E. variables with J.C. variables show a more distinct pattern in the girls' results. Qualifying Arithmetic yields high correlations/

\* Second Report op.cit. H.M.S.O., 1955.



TABLE 3. : Correlations in Sample (BOYS N = 338).

I.Q.	Eng. Comp.	Eng. Lang.	Arith.	Eng.	Latin	French	History	Geog.	Arith.	Alge- bra	Geom- etry	Science	Draw- ing
x <sub>1</sub>	x <sub>2</sub>	x <sub>3</sub>	x <sub>4</sub>	y <sub>1</sub>	y <sub>2</sub>	y <sub>3</sub>	y <sub>4</sub>	y <sub>5</sub>	y <sub>6</sub>	y <sub>7</sub>	y <sub>8</sub>	y <sub>9</sub>	y <sub>10</sub>
x <sub>1</sub>	-	.328	.485	.368	.250	.327	.200	.300	.416	.433	.422	.316	.204
x <sub>2</sub>	.328	-	.380	.392	.201	.218	.253	.220	.324	.265	.223	.177 <sup>*</sup>	.223
x <sub>3</sub>	.521	.560	.473	.368	.239	.266	.271	.321	.371	.304	.268	.311	.172 <sup>*</sup>
x <sub>4</sub>	.485	.380	.473	.229	.275	.301	.195	.241	.643	.618	.458	.334	.185 <sup>*</sup>
y <sub>1</sub>	.368	.392	.229	-	.611	.543	.585	.365	.423	.394	.464	.448	.207
y <sub>2</sub>	.250	.201	.275	.611	-	.669	.501	.346	.493	.519	.547	.519	.255
y <sub>3</sub>	.327	.218	.301	.543	.669	-	.469	.334	.507	.520	.589	.545	.202
y <sub>4</sub>	.200	.253	.195	.585	.501	.469	-	.560	.391	.359	.371	.405	.170 <sup>*</sup>
y <sub>5</sub>	.300	.321	.241	.365	.346	.334	.560	-	.415	.347	.396	.422	.344
y <sub>6</sub>	.416	.371	.643	.415	.493	.507	.391	.415	-	.783	.712	.509	.200
y <sub>7</sub>	.433	.304	.618	.394	.519	.520	.359	.347	.783	-	.748	.492	.220
y <sub>8</sub>	.422	.268	.458	.464	.547	.589	.371	.396	.712	.748	-	.543	.360
y <sub>9</sub>	.316	.311	.334	.448	.519	.545	.405	.422	.509	.492	.543	-	.270
y <sub>10</sub>	.204	.223	.185 <sup>*</sup>	.207	.255	.202	.170 <sup>*</sup>	.344	.200	.220	.360	.270	-

\* All correlations below .195 are not significant at 5 per cent level.

TABLE 4. : Correlations in Sample (GIRLS N = 141).

I.Q.	Eng. Comp.	Eng. Lang.	Arith. Eng.	Latin	French	History	Geog.	Arith.	Alge- bra	Geom- etry	Science	Draw- ing	
x1	x2	x3	x4	y1	y2	y3	y4	y5	y6	y7	y8	y9	y10
x1	-	.398	.453	.388	.427	.183 <sup>*</sup>	.337	.228	.417	.397	.318	.332	.244
x2	.398	-	.546	.355	.406	.214	.287	.269	.244	.212	.202	.310	.263
x3	.453	.546	-	.358	.475	.426	.454	.364	.229	.177 <sup>*</sup>	.165 <sup>*</sup>	.445	.238
x4	.388	.355	.358	-	.257	.112 <sup>*</sup>	.218	.116 <sup>*</sup>	.600	.467	.372	.384	.295
y1	.427	.406	.475	.257	-	.546	.622	.471	.382	.391	.436	.548	.303
y2	.183 <sup>*</sup>	.214	.426	.112 <sup>*</sup>	.546	-	.724	.503	.286	.335	.484	.539	.412
y3	.337	.287	.454	.218	.622	.724	-	.470	.347	.430	.541	.521	.189 <sup>*</sup>
y4	.228	.269	.364	.116 <sup>*</sup>	.471	.503	.470	-	.585	.190 <sup>*</sup>	.179 <sup>*</sup>	.368	.090 <sup>*</sup>
y5	.195	.178 <sup>*</sup>	.253	.186 <sup>*</sup>	.382	.286	.347	.585	-	.192 <sup>*</sup>	.189 <sup>*</sup>	.296	.305
y6	.417	.244	.229	.600	.391	.335	.430	.190 <sup>*</sup>	.192 <sup>*</sup>	-	.753	.531	.285
y7	.397	.212	.177 <sup>*</sup>	.467	.436	.484	.541	.179 <sup>*</sup>	.753	-	.693	.478	.183 <sup>*</sup>
y8	.318	.202	.165 <sup>*</sup>	.372	.396	.313	.417	.132 <sup>*</sup>	.648	.693	-	.505	.310
y9	.332	.310	.445	.384	.548	.539	.521	.368	.531	.478	.505	-	.293
y10	.244	.263	.238	.295	.303	.412	.189 <sup>*</sup>	.090 <sup>*</sup>	.285	.183 <sup>*</sup>	.310	.293	-

\* All correlations below .195 are not significant at 5 per cent level.

with J.C. maths and low ones with the language subjects, the opposite being the case for English Language. English Composition has relatively low correlations with the J.C. subjects, while the Intelligence Test correlates best with English and the mathematical subjects in J.C. These observations also apply to the boys' results which are, however, lower than the girls' (except for the correlations of Q.E. Arithmetic and J.C. Maths.)

The correlations between the Q.E. tests and sums of scores in several J.C. variables, each equally weighted, were found by the pooling square. Using the summed scores in all ten J.C. subjects as criterion, the following correlations with Q.E. were obtained.

TABLE 5. : Pooled Sample Correlations of Q.E. with J.C. (equally weighted.)

Q.E. variables	BOYS	GIRLS
Intelligence Test ( $x_1$ )	.457	.454
English Composition ( $x_2$ )	.352	.381
English Language ( $x_3$ )	.408	.475
Arithmetic ( $x_4$ )	.499	.443
Q.E. ( $x_1+x_2+x_3+x_4$ , equally weighted)	.557	.584

Note: ( $x_1+x_2+x_3+x_4$ ) is the sum of scores in Q.E. tests, equally weighted.

The girls' total scores in Q.E. correlate better with J.C. performance, English Language giving the highest single reading, whereas for boys, Arithmetic correlates/

best.

The Advisory Council's results<sup>x</sup> are somewhat higher. The Q.E. variables ( $x_1, x_2, x_3$  and  $x_4$ ) give correlations of .57 , .43 , .51 and .60 respectively with a criterion of six J.C. subjects. The correlation of the Q.E. battery with this criterion was .65. The Council's results did not include figures for boys and girls separately, but the correlations which they obtained for a mixed group are of the same order of magnitude as the boys' results in the present inquiry.

The pooled correlations in Table 5 are based on equally weighted scores, four tests being included in the Q.E. battery. Selection, however, was made on the sum of scores in English Composition, English Language and Arithmetic only, these scores having been weighted in the ratio of 1 : 2 : 2. When these weights were used, the correlation of Q.E. ( $x_2+x_3+x_4$  only) with J.C. dropped to .529 for boys, and .564 for girls. By including the Intelligence Test in the battery and using weights of 1 : 1 : 2 : 2 (for  $x_1, x_2, x_3$  and  $x_4$ ) correlations of .553 for boys and .588 for girls were obtained, figures which are almost identical with those obtained in Table 5 using equally weighted scores.

Table 6 gives the correlations of the Q.E. with a criterion consisting of the summed totals in J.C. maths, i.e. Arithmetic, Algebra and Geometry.

<sup>x</sup> Second Report op. cit. H.M.S.O. 1955.



TABLE 6. : Pooled Sample Correlations of Q.E.  
with J.C. Maths. ( $y_6+y_7+y_8$ , equally weighted)

Q.E. variables	BOYS	GIRLS
Intelligence Test ( $x_1$ )	.465	.422
English Composition ( $x_2$ )	.297	.245
English Language ( $x_3$ )	.344	.213
Arithmetic ( $x_4$ )	.628	.537
Q.E. ( $x_1+x_2+x_3+x_4$ , equally weighted)	.563	.473

The boys' scores in Q.E. correlate better than the girls' with J.C. maths. For both sexes, the best correlation with this criterion is given by the Arithmetic test.

Lastly, the language subjects viz. English, Latin and French, were treated as the criterion.

TABLE 7. : Pooled Sample Correlations of Q.E.  
with J.C. Languages ( $y_1+y_2+y_3$ , equally weighted.)

Q.E. variables	BOYS	GIRLS
Intelligence Test ( $x_1$ )	.367	.364
English Composition ( $x_2$ )	.314	.348
English Language ( $x_3$ )	.338	.521
Arithmetic ( $x_4$ )	.333	.225
Q.E. ( $x_1+x_2+x_3+x_4$ , equally weighted)	.439	.486

For boys, the I.Q. gives the best single prediction of performance in J.C. languages but the Q.E./



total is a more reliable guide (Table 7.) The girls' scores in English Language, however, give a higher correlation with J.C. languages than the Q.E. battery as a whole. These correlations, especially for boys, are rather low but it must be remembered that the Q.E. language tests were in English, whereas in the criterion two new languages, Latin and French, were present.

These 3 sets of pooled correlations show the degree of concordance between scores in the Q.E. variables and totals in groups of J.C. subjects. The correlations involving English Composition are low in each case and confirm the findings of the Advisory Council. On the other hand, I.Q. correlates well with each of the 3 criteria. English Language gives the best correlation with a criterion consisting of languages, while Q.E. Arithmetic has a high correlation with the mathematical criterion.

(7) Regression Coefficients and Multiple Correlations in Sample.

The calculation of the regression coefficients involved finding the reciprocal of the correlation matrix for the Q.E. variables, with unities inserted in the diagonal cells. This reciprocal matrix was then used to post - multiply the correlation matrix of the Q.E. variables with the J.C. variables.

TABLE 8. : Regression Coefficients and Multiple Correlations in Sample.

Regression of Criterion on	Criterion of 10 J.C. subjects ( $y_1 + y_2 + \dots + y_{10}$ )		Criterion of maths subjects ( $y_6 + y_7 + y_8$ )		Criterion of lang- uage subjects ( $y_1 + y_2 + y_3$ )	
	BOYS	GIRLS	BOYS	GIRLS	BOYS	GIRLS
Intelligence $x_1$	.2295	.2168	.2168	.2767	.2092	.1511
Eng. Comp. $x_2$	.1172	.0710	.0519	.0216	.1481	.0600
Eng. Lang. $x_3$	.0782	.2510	-.0457	-.0861	.0817	.4212
Arithmetic $x_4$	.3058	.2436	.5249	.4528	.1366	-.0055
$r_m = .575$ $r_m = .594$ $r_m = .656$ $r_m = .589$ $r_m = .443$ $r_m = .542$						

In order to obtain the best prediction of performance in J.C., the standardised scores in the Q.E. tests must be multiplied by these regression coefficients. The regression coefficients may therefore be regarded as showing the relative effectiveness of the Q.E. tests in predicting the criterion/

for the sample of children from which the present data have been derived.

The multiple correlation ( $\tau_m$ ) gives the highest possible correlation of the Q.E. as a whole with the criterion. It results from weighting each test in the Q.E. in proportion to its regression coefficient.

(8) Influence of Selection

The pupils whose scores have formed the basis of the foregoing calculations constitute a highly artificial group. Several diverse influences have operated in the selection of the pupils so that the sample is no longer truly representative of the population of primary school children of examination age. The first selection from this population was made by headmasters and parents who chose the entrants for the examination. From these candidates, less than 40 per cent were selected for admission to grammar schools mainly on the results of the three attainments tests, and, in the case of border-line candidates, also on performance in the Intelligence Test. The grammar schools accepted another class of candidates as fee-payers although they had been unsuccessful in Q.E. Further selection occurred when it was decided to include in the present sample only those pupils who had scores in the 10 J.C. subjects. The departure of a number of children, mostly the duller, before the end of the third school year provides yet another selective influence.

The situation, then, is one of extreme complexity. Of these various factors which determine selection, the Q.E. scores alone appear to be correlated with the criterion; the other influences appear to be of a random/

nature and may therefore be disregarded. The only practicable assumption is that the latter do in fact operate at random and that selection has taken place solely through the scores in Q.E.

The effect of this selection is to reduce the standard deviations of the several variables and to depress their intercorrelations below the values for the unselected population. The reduction in standard deviation, however, will not be the same for all variables, for selection was governed primarily by the two English tests and the Arithmetic test. The standard deviation of the Intelligence Test will be indirectly affected through its correlation with the other three tests and thus it will be lowered proportionately less. Hence the correlations with the criterion of the Intelligence Test will not be reduced so much as those of the English and Arithmetic tests, and thus the regression coefficients calculated for the sample will unduly favour the Intelligence Test.

To make the comparison valid, it is necessary to counteract the effect of selection and calculate estimated statistics for the complete primary school population of Qualifying age. The method was that employed in W.C. Emmett's "An Inquiry into the Prediction of Secondary School Success".

The/



The correction technique requires a knowledge of the standard deviations and intercorrelations of the predicting variables for the complete population. Since these data were not available, two samples, representative of the complete population of boys and of girls, were selected from the 1948 Q.E. results. These samples were constructed to give a mean I.Q. of 100 and a standard deviation of 15 in the Intelligence Test, the values which the latter would give in a complete population. In so doing we have made the assumption that the distribution of Intelligence in Northern Ireland is the same as among the English children on whom the test was standardised.

The standard deviations and intercorrelations of the Q.E. variables were then calculated for this representative sample (Table 9.)

Since the Intelligence Test had only been used for a small number of cases in the border-line zone, correction was based on the data for the attainments tests only.

Table 9: /

TABLE 9. : Standard Deviations and Intercorrelations of Q.E. variables in sample representing the population.

BOYS (N = 141)					GIRLS (N = 149)				
	$x_1$	$x_2$	$x_3$	$x_4$		$x_1$	$x_2$	$x_3$	$x_4$
$x_1$	-	.729	.863	.805	$x_1$	-	.589	.785	.702
$x_2$	.729	-	.808	.725	$x_2$	.589	-	.737	.598
$x_3$	.863	.808	-	.821	$x_3$	.785	.737	-	.780
$x_4$	.805	.725	.821	-	$x_4$	.702	.598	.780	-
$\sigma$	15.21	20.81	45.85	44.64	$\sigma$	14.90	19.67	41.88	40.32

In applying a similar correction procedure, the Advisory Council had at their disposal the intercorrelations of Q.E. tests for a random sample of the population. Their results were slightly smaller than the entries for boys in Table 9. but the order of magnitude was the same for both. The claim of the present samples to be regarded as representative of the population is further supported by the fact that the standard deviations of  $x_2$ ,  $x_3$  and  $x_4$  are approximately in the ratio of 1 : 2 : 2 which was the proportion to be yielded by the scaling procedure.

(9) Standard Deviations and Correlations in Population.

After correction for selection had been carried out, a new set of standard deviations and correlations were obtained, results which would be expected had the complete population been examined. For purposes of comparison, it was deemed advisable to include in the following tables the standard deviations and correlations for the Q.E. tests derived from the correction formulae instead of those observed in the representative sample. (See Tables 10 & 11.)

The standard deviations in the population show considerable increases over the results for the J.C. sample. The boys' scores are more widely scattered than the girls' in all variables except the Intelligence Test, J.C. History and J.C. Geography. Of the J.C. subjects, Algebra and Latin give the greatest discrimination, English and Drawing the least. The standard deviations of the J.C. subjects still display wide variations, again stressing the need for scaling.

The correlation coefficients, too, have been increased. The mathematical subjects in J.C. ( $y_6$ ,  $y_7$  and  $y_8$ ) now correlate very highly among themselves and with the Q.E. Arithmetic paper. The language subjects ( $y_1$ ,  $y_2$  and  $y_3$ ) give good correlations with one another and with the verbal tests in Q.E., this being especially noticeable for girls. History correlates with the languages somewhat better than/

TABLE 10. : Correlations in Population (BOYS).

I.Q.	Eng. Comp.	Eng. Lang.	Arith. Eng.	Latin	French	History	Geog.	Arith.	Alge- bra	Geom- etry	Science	Draw- ing		
x <sub>1</sub>	x <sub>2</sub>	x <sub>3</sub>	x <sub>4</sub>	y <sub>1</sub>	y <sub>2</sub>	y <sub>3</sub>	y <sub>4</sub>	y <sub>5</sub>	y <sub>6</sub>	y <sub>7</sub>	y <sub>8</sub>	y <sub>9</sub>	y <sub>10</sub>	
x <sub>1</sub>	-	.569	.704	.685	.510	.388	.461	.339	.436	.609	.608	.465	.313	
x <sub>2</sub>	.569	-	.755	.661	.538	.364	.393	.390	.389	.574	.518	.379	.335	
x <sub>3</sub>	.704	.755	-	.738	.528	.401	.437	.409	.467	.624	.564	.484	.305	
x <sub>4</sub>	.685	.661	.738	-	.442	.426	.462	.360	.416	.782	.752	.500	.315	
y <sub>1</sub>	.510	.538	.528	.442	-	.664	.613	.638	.460	.554	.526	.539	.292	
y <sub>2</sub>	.388	.401	.426	.664	-	.711	.556	.427	.576	.596	.614	.584	.322	
y <sub>3</sub>	.461	.437	.462	.613	.711	-	.533	.424	.599	.607	.656	.612	.280	
y <sub>4</sub>	.339	.409	.360	.638	.556	.533	-	.611	.489	.461	.460	.481	.241	
y <sub>5</sub>	.436	.467	.416	.460	.427	.424	.611	-	.526	.489	.494	.505	.405	
y <sub>6</sub>	.609	.624	.782	.554	.576	.599	.489	.526	-	.851	.780	.612	.312	
y <sub>7</sub>	.608	.564	.752	.526	.596	.607	.461	.489	.851	-	.807	.596	.323	
y <sub>8</sub>	.568	.490	.611	.565	.614	.656	.460	.494	.780	.807	-	.625	.430	
y <sub>9</sub>	.465	.484	.500	.539	.584	.612	.481	.505	.612	.596	.625	-	.345	
y <sub>10</sub>	.313	.305	.315	.292	.322	.280	.241	.405	.312	.323	.430	.345	-	
σ	12.26	20.16	39.62	54.42	51.25	81.50	78.51	64.70	56.63	76.27	86.29	79.21	69.41	51.79



TABLE 11. : Correlations in Population (GIRLS).

Scoring in Operation (Girls).														
I.Q.	Eng. Comp.	Eng. Lang.	Arith.	Eng.	Latin	French	History	Geog.	Arith.	Algebra	Geometry	Science	Drawing	
x <sub>1</sub>	x <sub>2</sub>	x <sub>3</sub>	x <sub>4</sub>	y <sub>1</sub>	y <sub>2</sub>	y <sub>3</sub>	y <sub>4</sub>	y <sub>5</sub>	y <sub>6</sub>	y <sub>7</sub>	y <sub>8</sub>	y <sub>9</sub>	y <sub>10</sub>	
x <sub>1</sub>	-	.577	.624	.587	.556	.309	.468	.342	.562	.519	.434	.492	.375	
x <sub>2</sub>	.577	-	.724	.619	.561	.354	.452	.389	.469	.402	.365	.508	.410	
x <sub>3</sub>	.624	.724	-	.642	.615	.513	.577	.462	.474	.390	.348	.609	.399	
x <sub>4</sub>	.587	.619	.642	-	.474	.293	.419	.289	.720	.591	.496	.573	.442	
y <sub>1</sub>	.556	.561	.615	.474	-	.604	.689	.538	.526	.540	.490	.645	.412	
y <sub>2</sub>	.309	.354	.513	.293	.604	-	.756	.551	.433	.548	.390	.600	.477	
y <sub>3</sub>	.468	.452	.577	.419	.689	.756	-	.533	.541	.617	.499	.611	.304	
y <sub>4</sub>	.342	.389	.462	.289	.538	.551	.533	-	.309	.281	.226	.454	.189	
y <sub>5</sub>	.302	.305	.367	.321	.454	.349	.417	.621	.299	.280	.307	.384	.373	
y <sub>6</sub>	.562	.469	.474	.720	.526	.433	.541	.309	-	.800	.702	.642	.407	
y <sub>7</sub>	.519	.402	.390	.591	.540	.548	.617	.281	.800	-	.736	.579	.301	
y <sub>8</sub>	.434	.365	.348	.496	.490	.390	.499	.226	.702	.736	-	.584	.397	
y <sub>9</sub>	.492	.508	.609	.573	.645	.600	.611	.454	.642	.579	.584	-	.410	
y <sub>10</sub>	.375	.410	.399	.442	.412	.477	.304	.189	.407	.301	.397	.410	-	
σ	12.32	18.76	35.26	50.49	46.87	78.42	65.00	68.16	64.63	66.54	72.05	69.93	65.46	49.57



Geography, while the correlations involving Drawing are still relatively small throughout.

When pooled correlations were calculated with the criterion of all ten J.C. subjects, equally weighted, it was found that larger increases occurred for the attainments tests than for the Intelligence Test. This bears out the contention that since selection was based primarily on the attainment test scores, their correlations will be depressed to a greater extent than those involving the Intelligence Test which was only used in selecting pupils from the border-line zone.

TABLE 12: Pooled Population Correlations of Q.E. with all ten J.C. subjects, equally weighted.

Q.E. variables	BOYS	GIRLS
Intelligence Test ( $x_1$ )	.619	.595
English Composition ( $x_2$ )	.570	.576
English Language ( $x_3$ )	.621	.649
Arithmetic ( $x_4$ )	.668	.631
Q.E. ( $x_1+x_2+x_3+x_4$ , equally weighted)	.709	.721

Note: The standard errors of these estimated correlation coefficients are complex and defy calculation on account of the approximations made in their derivation.

The correlations of the Q.E. variables with J.C. (Table 12) have all increased considerably as the result/

of correction for selection. Furthermore, there is now very close correspondence between the boys' and girls' results, the girls' scores in Q.E. as a whole having a slightly higher correlation with J.C. than the boys'.

The pooled correlations of Q.E. with a criterion consisting of J.C. Arithmetic, Algebra and Geometry, equally weighted, were calculated (Table 13.)

TABLE: 13: Pooled Population Correlations of Q.E. with J.C. Maths ( $y_6+y_7+y_8$ , equally weighted.)

Q.E. variables	BOYS	GIRLS
Intelligence Test ( $x_1$ )	.636	.554
English Composition ( $x_2$ )	.547	.452
English Language ( $x_3$ )	.598	.443
Arithmetic ( $x_4$ )	.764	.661
Q.E. ( $x_1+x_2+x_3+x_4$ , equally weighted.)	.728	.621

These results accord with what was found in the sample correlations. The boys' totals in Q.E. are more highly correlated with a mathematical criterion than the girls', and this is true of each of the Q.E. variables separately. For both boys and girls, Qualifying Arithmetic has better correlations than the other Q.E. tests.

Pooled population correlations of Q.E. with J.C. Languages were also calculated (Table 14.) For this J.C. English + Latin + French, equally weighted, were regarded as the criterion.

TABLE.14: Pooled Population Correlations of Q.E. with J.C. Languages ( $y_1+y_2+y_3$ , equally weighted.)

Q.E. variables	BOYS	GIRLS
Intelligence Test ( $x_1$ )	.515	.500
English Composition ( $x_2$ )	.490	.513
English Language ( $x_3$ )	.517	.640
Arithmetic ( $x_4$ )	.504	.445
Q.E. ( $x_1+x_2+x_3+x_4$ , equally weighted.)	.580	.617

The Q.E. battery correlates better for girls than for boys, though in each case these figures (Table 14) are much lower than the corresponding figures for J.C. as a whole (Table 12) and for the maths criterion (Table 13.)

(10) The Relative Predictive Values of the Q.E. Variables.

This section is concerned with estimating the relative predictive values of the Intelligence Test ( $x_1$ ), English Composition ( $x_2$ ), English Language ( $x_3$ ) and Arithmetic ( $x_4$ ), when each is considered in relation to a predicting battery which includes the remaining three tests. These estimates must take account of the correlations of the predicting variables among themselves. A high correlation between two tests indicates that they measure almost the same aspect of the criterion; that which predicts the criterion better will have a much larger regression coefficient since it leaves little for the other test to do. Regression coefficients must therefore be used to determine the relative predictive merits of the variables in a battery.

A complete set of regression coefficients for the sample was calculated at an earlier stage. They provide reliable estimates of the prediction of J.C. success within that sample but the results do not apply to the population. For this reason they have been replaced here by estimated regression coefficients for the population. In each case, these regression coefficients have been used as weights to calculate the multiple correlations ( $r_m$ ) of the Q.E. with the criterion.

(a) Prediction of J.C. ( $y_1+y_2+.....+y_{10}$ )

TABLE 15/



TABLE 15. : Population Regression Coefficients  
for Q.E. variables and 10 J.C. subjects.

Regression of Criterion on	BOYS	GIRLS
Intelligence Test ( $x_1$ )	.2386	.2113
English Composition ( $x_2$ )	.1321	.0763
English Language ( $x_3$ )	.0997	.2842
Arithmetic ( $x_4$ )	.3434	.2771
	$r_m = .717$	$r_m = .727$

Note: These (and subsequent) regression coefficients are derived from correlation coefficients the standard errors of which are not known. They are probably unstable and the predictions based on them must be viewed with caution.

Arithmetic, for boys, and Arithmetic and English Language for girls play the major roles in predicting J.C. success, with the Intelligence Test doing a considerable part of the work for both sexes (Table 15). The predictive value of English Composition is small.

The multiple correlations of .717 and .727 for boys and girls respectively show the degree of concordance between Q.E. and J.C. Although these figures are as high as might be expected, they do reveal considerable imperfections in the predicting battery. In a similar inquiry in West Riding\* where the/

\* Emmett, W.G., "Secondary Modern and Grammar School Performance Predicted by Tests given in Primary Schools". Brit.J. Educ. Psy. Vol.XXIV, Part II, 1954.



entrance examination consisted of standardised tests in Intelligence, English and Arithmetic, it was found that a multiple correlation of .831 existed between the predicting battery and a criterion similar to J.C. The Advisory Council<sup>+</sup> quote a multiple correlation of .84 .

(b) Prediction of Mathematical Subjects in J.C.  
( $y_6+y_7+y_8$ )

TABLE 16. : Population Regression Coefficients for Q.E. variables and J.C. Maths.

Regression of Criterion on	BOYS	GIRLS
Intelligence Test ( $x_1$ )	.2199	.2839
English Composition ( $x_2$ )	.0549	.0248
English Language ( $x_3$ )	-.0539	-.1006
Arithmetic ( $x_4$ )	.6172	.5437
	$r_m = .781$	$r_m = .695$

A criterion consisting of Arithmetic, Algebra and Geometry in J.C. is best predicted by Qualifying Arithmetic, with the Intelligence Test playing a subsidiary part. (Table 16) Neither of the English tests takes any part in the prediction. The negative values for  $x_3$  are not statistically significant.

The multiple correlation for boys is considerably higher than for girls, suggesting that success in Arithmetic/

+ (Second Report, op.cit. H.M.S.O. 1955 )

and in the Intelligence Test at Q.E. level is a more reliable guide to boys' performances in J.C. maths. For both sexes these population correlations (.781 and .695) represent a marked increase over the corresponding figures in the sample (.656 and .589).

(c) Prediction of Language Subjects in J.C. ( $y_1+y_2+y_3$ )

TABLE 17. : Population Regression Coefficients for Q.E. variables and J.C. Languages.

Regression of Criterion on	BOYS	GIRLS
Intelligence Test ( $x_1$ )	.2396	.1540
English Composition ( $x_2$ )	.1774	.0655
English Language ( $x_3$ )	.1115	.5014
Arithmetic ( $x_4$ )	.1399	-.0076
	$r_m = .582$	$r_m = .654$

For boys the Intelligence Test gives the best prediction of success in J.C. languages (English, Latin and French) but it is not significantly better than the other three Q.E. variables, all of which contribute to the prediction. The girls' results are quite different, and more clearly defined. English Language is by far the best single predictor and is significantly better than the Intelligence Test which plays a small part in the prediction. The regressions for English Composition and Arithmetic are both negligible.

The/

The girls' scores yield a higher multiple correlation than the boys', but both are somewhat lower than the corresponding multiple correlations with J.C. as a whole, and with the mathematical criterion.

Regression coefficients were also calculated using each of the J.C. subjects in turn as the criterion. These results determine the relative values of the Q.E. tests in predicting the separate subjects in J.C.

(i) J.C. English ( $y_1$ )

TABLE 18. : Population Regression Coefficients for Q.E. variables and J.C. English.

Regression of J.C. English on	BOYS	GIRLS
Intelligence Test ( $^b_{x_1y_1}$ )	.2692	.2414
English Composition ( $^b_{x_2y_1}$ )	.3139	.1753
English Language ( $^b_{x_3y_1}$ )	.1435	.3299
Arithmetic ( $^b_{x_4y_1}$ )	-.0564	.0123
	$r_m = .598$	$r_m = .664$

For boys, English Composition predicts J.C. English much better than English Language, but this is reversed for girls (Table 18). For both sexes, I.Q. plays a prominent part in the prediction while Arithmetic takes no part whatever. It is difficult to explain why the boys' and girls' results should differ so/

widely for  $x_2$  and  $x_3$ , but in other respects, they agree with expectations. The negative regression for  $x_4$  (boys) is not significant.

(ii) J.C. Latin ( $y_2$ )

TABLE 19.: Population Regression Coefficients  
For Q.E. variables and J.C. Latin.

Regression of J.C. Latin on	BOYS	GIRLS
Intelligence Test ( $b_{x_1y_2}$ )	.1321	.0036
English Composition ( $b_{x_2y_2}$ )	.0776	-.0198
English Language ( $b_{x_3y_2}$ )	.0857	.5619
Arithmetic ( $b_{x_4y_2}$ )	.2213	-.0579
	$r_m = .456$	$r_m = .515$

When these regression coefficients in Table 19 were tested for significance, only Arithmetic for boys, and English Language for girls turned out to be significant at the 5 per cent level. These tests must therefore be performing the work of predicting J.C. Latin.

At first sight, the girls' results appear more reasonable. On further consideration, however, it is not impossible that Arithmetic and Latin do have something in common, as the boys' results suggest. In J.C., Latin involves little literary appreciation but is rather a form of coding and decoding, eg. "they have given" /



becomes equated with "dederunt", a process not unlike  $7 + 5 = 12$ . It is conceivable that the boy with ability to do arithmetic adapts it, consciously or unconsciously, to his study of Latin. The author was unable to find confirmation of this in other research.

(iii) J.C. French ( $y_3$ )

TABLE 20. : Population Regression Coefficients for Q.E. variables and J.C. French.

Regression of J.C. French on	BOYS	GIRLS
Intelligence Test ( $^b x_1 y_3$ )	.2312	.1652
English Composition ( $^b x_2 y_3$ )	.0766	.0193
English Language ( $^b x_3 y_3$ )	.0658	.4436
Arithmetic ( $^b x_4 y_3$ )	.2046	.0254
	$r_m = .510$	$r_m = .594$

For the boys, the Intelligence and Arithmetic scores give the best indication of performance in J.C. French, the regressions for  $x_2$  and  $x_3$  being insignificant. With the girls, however, it is English Language which is predicting J.C. French, with the Intelligence Test giving some assistance.

Once again, the girls' results agree better with expectations, and with the outcome of other investigations. An unpublished follow-up conducted by the/



staff of Edinburgh University Department of Education on data from Cheshire Education Authority showed the standardised English test to predict grammar school success in French, while the other two predicting variables (Intelligence and Arithmetic) took no part in the prediction. This was the case for both sexes. The West Riding inquiry<sup>†</sup> showed that, in a similar predicting battery, English gave the best prediction of performance in French five years later, though here Intelligence and Arithmetic both played a considerable part in the prediction. Results were not available for boys and girls separately.

The girls' results in this investigation are more in line with previous work than the boys' results. One should not discount the possibility, however, of J.C. French (boys) depending on some underlying ability which is present in mathematics, as was suggested for J.C. Latin (boys), but this must remain an open question until further research has been carried out.

(iv) J.C. History ( $y_4$ )

TABLE 21/

+ Emmett, W.G. op. cit.

TABLE 21. : Population Regression Coefficients  
for Q.E. variables and J.C. History.

Regression of J.C. History on	BOYS	GIRLS
Intelligence Test ( $b_{x_1y_4}$ )	.0675	.0852
English Composition ( $b_{x_2y_4}$ )	.1680	.1143
English Language ( $b_{x_3y_4}$ )	.1875	.3713
Arithmetic ( $b_{x_4y_4}$ )	.0645	-.0702
	$r_m = .434$	$r_m = .474$

Table 21 shows that success in J.C. History is predicted equally well by the two English tests for boys, but English Language does the major share of the work for girls. The regression coefficients for Intelligence and Arithmetic are not significant at the 5 per cent level.

(v) J.C. Geography ( $y_5$ )

TABLE 22. : Population Regression Coefficients  
for Q.E. variables and J.C. Geography.

Regression of J.C. Geography on	BOYS	GIRLS
Intelligence Test ( $b_{x_1y_5}$ )	.1821	.0805
English Composition ( $b_{x_2y_5}$ )	.0486	.0257
English Language ( $b_{x_3y_5}$ )	.2437	.2253
Arithmetic ( $b_{x_4y_5}$ )	.0796	.1130
	$r_m = .495$	$r_m = .389$

English Language plays the most prominent part in predicting J.C. Geography, the Intelligence Test joining in the prediction of boys' scores (Table 22.) None of the other regression coefficients is significant at the 5 per cent level.

The absence of English Composition from the prediction of Geography is surprising for both depend largely on verbal ability. Essay-type answers play a large part in the Geography paper, although other abilities (e.g. visual memory) operate also.

Other investigators have expressed distrust in the prediction of Geography. Although the multiple correlations for the present data are relatively low, the regression coefficients are quite clearly defined, especially for boys.

(vi) J.C. Arithmetic ( $y_6$ )

TABLE 23. : Population Regression Coefficients for Q.E. variables and J.C. Arithmetic.

Regression of J.C. Arithmetic on	BOYS	GIRLS
Intelligence Test ( $b_{x_1y_6}$ )	.1190	.2443
English Composition ( $b_{x_2y_6}$ )	.0743	-.0048
English Language ( $b_{x_3y_6}$ )	.0073	-.0792
Arithmetic ( $b_{x_4y_6}$ )	.6461	.6299
	$r_m = .791$	$r_m = .742$

As one would expect, the prediction of J.C. Arithmetic is best performed by Q.E. Arithmetic (Table 23.) The regression coefficients for Intelligence are also significant, but they are statistically inferior (at 5 per cent level) to those of Arithmetic.

The fact that for J.C. Arithmetic, the multiple correlation is so high compared with previous  $r_m$ 's seems to indicate that here we are concerned with factors in the criterion which are more readily assessed than those involved earlier. This does not imply that the latter are unimportant; it merely shows that they are not being predicted so well as Arithmetic.

(vii) J.C. Algebra ( $y_7$ )

TABLE 24 : Population Regression Coefficients for Q.E. variables and J.C. Algebra.

Regressions of J.C. Algebra on	BOYS	GIRLS
Intelligence Test ( $^b_{x_1y_7}$ )	.2003	.3009
English Composition ( $^b_{x_2y_7}$ )	.0387	.0181
English Language ( $^b_{x_3y_7}$ )	-.0899	-.1190
Arithmetic ( $^b_{x_4y_7}$ )	.6558	.4798
	$r_m = .764$	$r_m = .633$

Arithmetic scores in the Q.E. provide the best guide to performance in J.C. Algebra, especially for boys/



(Table 24). The Intelligence Test also takes part in the predictors and to a greater extent than in the prediction of Arithmetic.

(viii) J.C. Geometry ( $y_8$ )

TABLE 25. : Population Regression Coefficients for Q.E. variables and J.C. Geometry.

Regressions of J.C. Geometry on	BOYS	GIRLS
Intelligence Test ( $^b x_1 y_8$ )	.2298	.2977
English Composition ( $^b x_2 y_8$ )	.0548	.0411
English Language ( $^b x_3 y_8$ )	-.0771	-.0684
Arithmetic ( $^b x_4 y_8$ )	.3766	.4305
	$r_m = .529$	$r_m = .646$

The two efficient predictors of Geometry are Arithmetic and Intelligence, the English tests taking no part whatever.

(ix) J.C. Experimental Science ( $y_9$ )

TABLE 26/





TABLE 26. : Population Regression Coefficients  
for Q.E. variables and J.C. Experimental Science.

Regressions of J.C. Science on	BOYS	GIRLS
Intelligence Test ( $b_{x_1y_9}$ )	.1634	.0950
English Composition ( $b_{x_2y_9}$ )	-.0445	.0264
English Language ( $b_{x_3y_9}$ )	.2071	.3548
Arithmetic ( $b_{x_4y_9}$ )	.2640	.2735
	$r_m = .540$	$r_m = .658$

For boys the prediction of Science (Table 26) is shared by the Intelligence Test, English Language and Arithmetic, but for girls, the work devolves on the latter two, the Intelligence Test taking no part in the prediction. In both cases English Composition is absent. These results are acceptable since the science paper is partly verbal and partly mathematical.

(x) J.C. Drawing ( $y_{10}$ )

TABLE 27/

TABLE 27. : Population Regression Coefficients  
for Q.E. variables and J.C. Drawing.

Regressions of J.C. Drawing on	BOYS	GIRLS
Intelligence Test ( $b_{x_1y_{10}}$ )	.1471	.1007
English Composition ( $b_{x_2y_{10}}$ )	.2080	.1487
English Language ( $b_{x_3y_{10}}$ )	-.0268	.0706
Arithmetic ( $b_{x_4y_{10}}$ )	.0966	.2461
	$r_m = .372$	$r_m = .486$

The prediction of success in J.C. Drawing (Table 27) hardly deserves serious consideration since none of the predicting variables approximates to the content of the Drawing examination. The latter is essentially a practical examination, no written answers being necessary, while the Qualifying tests are of an academic nature and make no claims to be testing practical skills.

The only regression coefficients which are significant are  $b_{x_2y_{10}}$  (boys) and  $b_{x_4y_{10}}$  (girls). The prediction of Drawing, such as it is, seems to depend on English Composition for boys (perhaps imagination is common to both) and on Arithmetic for girls. One might tentatively suggest that the latter could be due to the presence of questions involving mathematical measurement.

The/

In the foregoing sections on prediction, no mention has been made of the influence of subjective judgment which undoubtedly plays an important part in the marking of several of the tests involved. This factor may well have distorted some of the results.

To sum up, the Intelligence Test takes part in the prediction of the boys' results in all J.C. subjects except History and Drawing. For girls, however, it is absent from the prediction of Latin, History, Geography, Science and Drawing. English Composition has very little predictive value in a battery which contains English Language. This latter is somewhat ineffective for boys, joining in the prediction of English History and Geography, but for girls it is the most important component of the Q.E. battery predicting all subjects except Maths. and Drawing. The Arithmetic test in Q.E. provides the best prediction of J.C. Maths. and Science for both sexes, and for boys it also takes part in the prediction of Latin and French.

The highest multiple correlations for boys are between the Q.E. and Arithmetic, Algebra and Geometry, while for girls it is Arithmetic, English and Experimental Science which give the best multiple correlations. The lowest correlations are for Drawing, History and Latin (boys) and Geography, History and Drawing (girls.)

(11) Factorial Analysis.

Exaggerated claims have been put forward regarding the factorial analysis of human abilities. Both Spearman and Thurstone, two of the leading pioneers in this field, have led one to expect it to lay bare "the causal mechanisms of the mind" by which we might explain correlation between tests. More reserved, however, have been the claims of the two British psychologists, Burt and Thomson. The former regarded factorial analysis as providing "exact and systematic description", whereas Thomson suggested that by a knowledge of factors we might improve the selection of candidates for different schools or careers.

It was with the latter end in view that the factorial analysis in the present investigation was undertaken. Our main problem was that of selecting pupils for grammar schools, and it was hoped that a factorial analysis might help us to ascertain something of the nature of the abilities involved in answering the J.C. papers and to discover whether the predicting battery involved the exercise of the same abilities. The results of the analysis would either justify the present method of selection, or suggest possible improvements.

## (a) Centroid Analysis.

The sample correlations for boys and girls were analysed by the centroid method. In the diagonal cells/



were inserted communalities which had been estimated by the "centroid formula".\* For a description of the method of analysis, the reader is referred to Thurstone.<sup>+</sup>

Five factors were extracted for boys, and four for girls (Tables 28 & 29). It is uncertain why different numbers of factors should emerge from the two sets of results. Renshaw<sup>†</sup>, in his investigation of space factors, found that although the same number of factors was present for boys and girls, these factors accounted for a greater proportion of the variance of the test battery in the case of girls. Something similar has taken place here, except that four factors for girls is accounting for more of the test variance than five factors for boys.

\* McNemar's test of the significance of the residuals was applied in each case. It showed that the analysis of the girls' matrix was complete after four factors had been extracted. The residual correlations for boys were still slightly significant after the extraction of five factors but these residuals were so small that it was decided to discontinue the analysis.

The agreement between the obtained and the estimated/

\* Thurstone, L.L., "Multiple Factor Analysis", (Chapter 13.)

+ Thurstone, L.L., op. cit., Chapter 11.

† Renshaw, T., "A Factorial Study of Two and Three Dimensional Space Tests." Unpublished Ph.D. Thesis, Edinburgh Univ. 1950.

\* McNemar, Q., "On the Number of Factors" Psychometrika, 1942, 7.



communalities is close, and reiteration was considered unnecessary. In the boys' data, the factors account for the most of the test variance in all tests except J.C. Drawing. For girls, the communality of J.C. Drawing is again small. This is understandable, however, since drawing is unlike any of the other tests in the battery.

TABLE. 28: Centroid Factor Loadings - BOYS (N = 338)

Tests.	Unrotated Factor Loadings					Obt.	Est.
	I	II	III	IV	V.	$h^2$	$h^2$
Q.E. Intelligence 1( $x_1$ )	.5775	-.2964	-.1341	.0819	-.2345	.5010	.5600
Q.E. Eng. Comp. 2( $x_2$ )	.4855	-.3042	-.3753	.1017	.1465	.5009	.5500
Q.E. Eng. Lang. 3( $x_3$ )	.5732	-.3793	-.3700	.2018	-.0820	.6568	.6500
Q.E. Arithmetic 4( $x_4$ )	.6211	-.4818	.1604	-.0599	-.0543	.6502	.6500
J.C. English 5( $y_1$ )	.6795	.2299	-.1843	.2524	.2509	.6752	.6400
J.C. Latin 6( $y_2$ )	.6893	.3584	.1499	.2114	.1224	.6857	.7000
J.C. French 7( $y_3$ )	.7012	.2663	.2076	.2541	-.0172	.6706	.6900
J.C. History 8( $y_4$ )	.6042	.3497	-.2142	-.1042	.2462	.6047	.6400
J.C. Geography 9( $y_5$ )	.5828	.2091	-.2591	-.3547	-.0773	.5823	.5700
J.C. Arithmetic 10( $y_6$ )	.7906	-.1973	.3244	-.1775	.1235	.8160	.8400
J.C. Algebra 11( $y_7$ )	.7688	-.1639	.4034	-.1588	.0885	.8137	.8300
J.C. Geometry 12( $y_8$ )	.7756	.0703	.3005	-.1374	-.0812	.7223	.7900
J.C. Science 13( $y_9$ )	.6606	.2103	.1204	.0558	-.1760	.5292	.5800
J.C. Drawing 14( $y_{10}$ )	.3771	.1290	-.1228	-.1696	-.3465	.3228	.3400

TABLE 29:/

TABLE 29: Centroid Factor Loadings - GIRLS (N = 141)

Tests		Unrotated Factor Loadings				Obt. h <sup>2</sup>	Est. h <sup>2</sup>
		I	II	III	IV		
Q.E. Intelligence	1(x <sub>1</sub> )	.5522	.0691	-.2671	.0362	.3824	.4000
Q.E. Eng. Comp.	2(x <sub>2</sub> )	.5107	-.1289	-.4404	.0682	.4760	.4800
Q.E. Eng. Lang.	3(x <sub>3</sub> )	.6067	-.2685	-.3764	.1672	.6098	.6000
Q.E. Arithmetic	4(x <sub>4</sub> )	.5510	.3704	-.3375	-.2339	.6094	.6000
J.C. English	5(y <sub>1</sub> )	.7337	-.1946	.0481	.1397	.5980	.6100
J.C. Latin	6(y <sub>2</sub> )	.6748	-.3344	.2799	.1072	.6570	.6900
J.C. French	7(y <sub>3</sub> )	.7325	-.1860	.2902	.2696	.7281	.7000
J.C. History	8(y <sub>4</sub> )	.5227	-.4241	.1995	-.1367	.5116	.5000
J.C. Geography	9(y <sub>5</sub> )	.4889	-.3137	.1114	-.5292	.6299	.5500
J.C. Arithmetic	10(y <sub>6</sub> )	.7016	.5350	.1236	-.0538	.7966	.7500
J.C. Algebra	11(y <sub>7</sub> )	.6973	.4678	.2686	.1571	.8019	.7700
J.C. Geometry	12(y <sub>8</sub> )	.6301	.4237	.1984	.0524	.6187	.6800
J.C. Science	13(y <sub>9</sub> )	.7103	.0106	.0771	.0395	.5121	.5200
J.C. Drawing	14(y <sub>10</sub> )	.4319	-.0260	-.1123	-.0857	.2072	.2800

Note: For convenience, the coding of the tests was changed. The Q.E. tests are now designated 1....4, and the J.C. subjects 5.....14.

(c) Rotation of Axes.

Negative factor loadings although mathematically acceptable constitute a source of embarrassment to the psychologist who prefers to express the common characteristics of a battery in positive terms. The number/

of negative loadings and their magnitude can be considerably reduced by rotating the centroid axes.

The rotations were carried out by the method of extended vectors, and in order to obtain the best approximation to simple structure, oblique factor axes were preferred. Diagrams were drawn to show the position of the test vectors in relation to these oblique axes. Table 30 gives the final rotating matrices.

TABLE 30: Final Rotating Matrices. BOYS

	I	A	B	C	D	E
I	1.0000	.2716	.4459	.4454	.3375	.2212
II		.0009	-.8811	-.2885	.0093	.0950
III		-.7397		.8433		-.1523
IV		-.0950			-.9413	
V		.6082	.1573	.0852		-.9585

GIRLS

	I	A	B	C	D
I	1.0000	.4953	.4765	.3366	.2136
II		.7862	-.4847		-.3035
III		.3695	-.2325	-.9349	.1377
IV			.6956	.1122	-.9183

The positions of the test vectors after rotation are illustrated in Appendix E. The diagrams for boys/

\* Thurstone, L.L., op. cit., Chapter 11.

show that Factors I, II, III and V. are all clearly defined, but the diagrams involving Factor IV (Figures (c), (f), (h) and (j) ) are not entirely satisfactory. Figures (c), (f) and (j) all show that several tests lie near neither factor axis. Further attempts at rotation failed to improve these diagrams. In Figure (h), a slight alteration to Factor IV (to make it pass through tests 8 and 9 ) is suggested. As the author did not contemplate proceeding to a second-order analysis he regarded this additional refinement as unnecessary.

The diagrams for girls are all acceptable. Each factor axis is located by several tests and the rotations may be regarded as satisfactory.

TABLE 31/



TABLE 31: Final Factor Loadings after Rotation

## BOYS

Tests			Rotated Factor Loadings				
			I	II	III	IV	V
Q.E.	Intelligence	1.	.1053	.4818	.2096	.1151	.3448
Q.E.	Eng. Comp.	2.	.4887	.5076	.0000	.0653	-.0047
Q.E.	Eng. Lang.	3.	.3600	.5769	.0457	.0000	.2257
Q.E.	Arithmetic	4.	.0222	.6929	.5463	.2615	.1192
J.C.	English	5.	.4497	.1399	.1023	-.0061	-.0402
J.C.	Latin	6.	.1310	.0109	.3404	.0369	.0463
J.C.	French	7.	.0025	.0753	.4091	.0000	.1653
J.C.	History	8.	.4825	.0000	.0085	.3053	-.0364
J.C.	Geography	9.	.3369	.0635	-.0258	.5325	.2623
J.C.	Arithmetic	10.	.0665	.5458	.6931	.4321	-.0117
J.C.	Algebra	11.	-.0209	.5012	.7374	.4075	.0081
J.C.	Geometry	12.	-.0479	.2711	.5716	.3918	.2103
J.C.	Science	13.	-.0219	.0816	.3201	.1724	.3165
J.C.	Drawing	14.	-.0014	.0000	-.0023	.2881	.4465

TABLE 32/



TABLE 32: Final Factor Loadings after Rotation.GIRLS

Tests		Rotated Factor Loadings			
		I	II	III	IV
Q.E. Intelligence	1.	.2291	.3170	.4397	.0269
Q.E. Eng. Comp.	2.	-.0111	.4557	.5912	.0250
Q.E. Eng. Lang.	3.	-.0497	.6231	.5748	.0057
Q.E. Arithmetic	4.	.4394	-.0012	.4747	.1736
J.C. English	5.	.2282	.5299	.2176	.0941
J.C. Latin	6.	.1747	.4931	-.0225	.1856
J.C. French	7.	.3238	.5592	.0055	.0051
J.C. History	8.	-.0008	.3131	-.0259	.3933
J.C. Geography	9.	.0367	-.0090	.0010	.7009
J.C. Arithmetic	10.	.8088	.0087	.1139	.0536
J.C. Algebra	11.	.8124	.1523	.0013	-.1003
J.C. Geometry	12.	.7185	.0852	.0325	-.0149
J.C. Science	13.	.3886	.3429	.1715	.1227
J.C. Drawing	14.	.1520	.1849	.2407	.1634

Boys' results: Factor I is a verbal factor of some kind, present in the two English tests in Q.E., in J.C. English, J.C. History and J.C. Geography. It is absent from Latin and French; this is plausible since/

the latter consist mainly of mechanical exercises in translation.

Factor II is present in all Q.E. tests but absent from all J.C. subjects except Arithmetic and Algebra. A factorial analysis of the data used by Emmett and Wilmot<sup>\*</sup> showed that the predicting tests had loadings in a factor which was absent from the grammar school subjects taken five years later. It has been suggested that this factor is due to the passage of time; for convenience it may be referred to as a "temporal" factor. At all events, some common bond is shared by all Q.E. tests. It may be that the teaching of English and Arithmetic by one person, as is the case in the primary school, accounts for this. This explanation could be extended to include J.C. Arithmetic and J.C. Algebra since these papers involve much of what was learned of these subjects in the primary school.

Factor III is important for success in the mathematical subjects. It is surprising that Latin and French should have loadings in this factor, but it had already been seen (§ 6) that Q.E. Arithmetic played an important part in the prediction of these subjects.

It was noticed that Factor IV was inadequately defined as the result of rotation. The factor loadings show that it overlaps to some extent Factor III. Although/

\* Emmett, W.G. and Wilmot, F.S., op. cit. The results of the factorial analysis which was carried out by the staff of Rm. 70, Moray House, have not been published.

the loadings here are smaller than for Factor III, they occur for all mathematical subjects and for History and Geography. Having accepted Factor III as a mathematical factor, one is at a loss for a name for Factor IV. This, perhaps, is a salutary warning of the dangers of tying labels to psychological factors.

The Intelligence Test, Science and Drawing have loadings in Factor V. Again, there is difficulty in finding an acceptable psychological interpretation and a suitable name. Science and Drawing both involve ability to sketch, but this would hardly account for the loading in Intelligence. Or, it may be that some form of visual imagery is common to all three examinations.

Girls' results: Factor I is clearly a mathematical factor. It corresponds closely to Factor III in the boys' analysis except that for Latin there is no large loading. French, however, is again loaded with this mathematical factor.

Factor II indicates a linguistic factor; it differs from the verbal factor for boys in that Latin, French and Science all have substantial loadings in this factor, while Geography has no loading.

Factor III is common to the Q.E. test and absent from J.C. subjects. This is similar to Factor II for boys, except that Arithmetic and Algebra no longer /

have loadings in this factor.

Factor IV suggests a bond which is common to History and Geography only.

From the point of view of prediction the boys' results are highly satisfactory. Each of the J.C. subjects has loadings in at least one of the factors, and each of these factors is measured by one or more of the Q.E. tests. For girls, however, Factor IV gives cause for concern. Here is a factor which is present in History and Geography and which is absent from the Q.E. battery. For History, the position is not so serious since it has a loading in the linguistic factor which is present in the Intelligence and English tests in Q.E. Geography, on the other hand, does not have a loading in any other factor. The answering of the J.C. Geography paper by girls involves some ability which is not being measured by the Q.E. It has already been noted that the prediction of Geography is unsatisfactory. The factorial analysis suggests that efforts should be made to identify the ability which enters into the Geography paper and to devise a suitable test for this ability for inclusion in the Q.E. battery.

Some psychologists would complain that no "g" factor is present for either boys or girls. It is probable that had we proceeded to a "second-order" analysis, the "g" factor would have emerged. As our main concern centred on selection, the absence of "g" is unimportant.

PART II.

FOLLOW-UP INQUIRY OF 1948 QUALIFYING EXAMINATION USING  
1953 SENIOR CERTIFICATE AS CRITERION.



(1) Object and Scope,

This part of the investigation is concerned with following up the performance of 1948 Q.E. candidates to the Senior Certificate level. The primary aim is to determine the efficiency with which Q.E. predicts success in Senior Certificate. Secondly, a factorial analysis was carried out to identify the mental abilities which operate in answering the papers.

(2) The Predicting Battery.

The predicting battery again comprised the four Q.E. tests administered to primary school pupils in 1948. These tests are described in detail in Part I § 2, and copies of the papers are included in the Appendix.

### (3) The Criterion.

The criterion which was used in this part of the investigation was the 1953 Senior Certificate examination (hereafter referred to as S.C.). It was an external examination administered by the Ministry of Education to pupils who had completed the grammar school course.

In 1953, a total of 3147 pupils (1657 boys and 1490 girls) entered for S.C. The proportion of passes was 70 per cent and 80 per cent respectively.

Most of the examination papers are set at two levels - (a) ordinary, (b) advanced. The advanced papers are intended for pupils who have made a specialised study of some subjects, and they are, for the most part, taken by pupils who have already obtained a Certificate and have returned to school for an Upper Sixth Form year. The majority of candidates enter for the 'ordinary' papers, twenty of which are set.

The total mark for each 'ordinary' paper is 400, with the pass level at 40 per cent. The rules governing choice of subjects are complicated, but generally speaking, a candidate must sit at least six subjects; the compulsory subjects are English Language and English Literature, either a language subject (other than English) or History, and either a mathematics or a science paper. In all he must pass in six subjects, though there is a system of compensation provided the aggregate does not fall below 40 per cent.

(4) The Sample.

A survey of the numbers of pupils taking the 'advanced' subjects showed that it would be impossible to obtain a group large enough for a statistical inquiry. The sample, therefore, was drawn from pupils who had scores at the 'ordinary' level. The most popular subjects were identified and estimates were found of the numbers of candidates taking various combinations of these subjects. The aim was to cover the widest possible range of subjects while ensuring that a sufficiently large number of candidates had scores in each subject. It finally emerged that the most suitable batteries were:-

TABLE 33: Subjects included in S.C. battery.

BOYS	GIRLS
$z_1$ = English Language	$z_1$ = English Language
$z_2$ = English Literature	$z_2$ = English Literature
$z_3$ = French	$z_3$ = French
$z_4$ = Maths (alternative)	$z_4$ = Maths (traditional)
$z_5$ = Physics	$z_5$ = Geography
$z_6$ = Chemistry	$z_6$ = Domestic Science

Samples of 162 boys and 186 girls had scores in the respective groups of subjects, and all had taken the 1948 Q.E. It should be noted that these scores were not drawn solely from the data included in Part I ; in fact, only a small number of pupils is included/

in both investigations.

Score sheets were compiled, listing for each candidate his scores in the 1948 Q.E. and in the six S.C. subjects. These score sheets were passed on to the Scientific Computing Service of London who used the 'Hollerith-card' system for carrying out the basic calculations.



(5) Means and Standard Deviations in Sample.

From the results furnished by the computing agency, means and standard deviations were calculated for all variables.

TABLES 34 & 35: Means and Standard Deviations in Sample.

Table 34

BOYS (N = 162)		
Subject	Mean	S.d.
Intelligence Test ( $x_1$ )	115.31	8.94
English Comp. ( $x_2$ )	53.08	16.21
English Lang. ( $x_3$ )	121.68	27.08
Arithmetic ( $x_4$ )	133.98	32.26
English Lang. ( $z_1$ )	198.05	41.78
English Literat. ( $z_2$ )	165.03	47.01
French ( $z_3$ )	175.38	50.67
Maths (alternative) ( $z_4$ )	276.67	58.97
Physics ( $z_5$ )	198.28	53.85
Chemistry ( $z_6$ )	199.35	50.49

Table 35

GIRLS (N = 186)		
Subject	Mean	S.d.
Intelligence Test ( $x_1$ )	110.31	9.64
English Comp. ( $x_2$ )	51.96	14.94
English Lang. ( $x_3$ )	108.79	26.86
Arithmetic ( $x_4$ )	106.61	32.51
English Lang. ( $z_1$ )	196.39	37.32
English Literat. ( $z_2$ )	176.41	48.99
French ( $z_3$ )	187.24	56.17
Maths (tradit.) ( $z_4$ )	171.96	65.17
Geography ( $z_5$ )	178.08	41.85
Domestic Science ( $z_6$ )	208.82	36.17

The mean scores for the Q.E. variables (Tables 34 & 35) show the boys to be superior to the girls in all four tests. This is contrary to what was found in the Part I sample, and in the sample studied by the Advisory Council; in both of these inquiries the boys were superior/

in Arithmetic only. Comparing the Q.E. mean scores in Tables 34 & 35 with the corresponding Table 2 in Part I, the boys' results are in close agreement, while for girls the present results are considerably lower than those in Part I. Perhaps the choice of S.C. subjects (which governed the selection of the samples) has favoured the inclusion of a greater proportion of duller pupils among the girls.

If this is so, the girls have applied themselves more seriously to the work of the grammar school; for at the S.C. level their mean scores in English Literature and French are higher than the boys' scores.

It should be noted that any comparison of the sexes must be viewed with caution. As was mentioned in Part I, § 5 and § 8, the selection of the samples has been affected by various complex influences which are not necessarily the same for boys and girls.

The standard deviations of the Q.E. variables (Tables 34 & 35) accord closely with the results recorded in Part I Table 2, Arithmetic alone showing any appreciable difference.

The standard deviations of the S.C. subjects range from 41.78 (English Language) to 58.97 (Maths) for boys, and from 36.17 (Domestic Science) to 65.17 (Maths) for girls. Since aggregates are used in determining the award of Certificates, all subjects should carry equal weights. These results point to the need for a scaling procedure which will make all S.C. subjects comparable.

(6) Correlations in Sample.

The intercorrelations of all variables were calculated for boys and girls (Tables 36 & 37).

TABLE 36: Sample Correlations of 1948 Q.E. and 1953 S.C. - BOYS.

	$x_1$	$x_2$	$x_3$	$x_4$	$z_1$	$z_2$	$z_3$	$z_4$	$z_5$	$z_6$
$x_1$	-	.385	.484	.424	.259	.157*	.236	.232	.216	.117*
$x_2$	.385	-	.499	.390	.243	.174*	.168*	.119*	.204	.062*
$x_3$	.484	.499	-	.414	.253	.233	.234	.075*	.148*	.068*
$x_4$	.424	.390	.414	-	.090*	.141*	.230	.388	.217	.187*
$z_1$	.259	.243	.253	.090*	-	.454	.383	.176*	.220	.178*
$z_2$	.157*	.174*	.233	.141:	.454	-	.424	.252	.367	.311
$z_3$	.236	.168*	.234	.230	.383	.424	-	.384	.361	.474
$z_4$	.232	.119*	.075*	.388	.176*	.252	.384	-	.520	.538
$z_5$	.216	.204	.148*	.217	.220	.367	.361	.520	-	.561
$z_6$	.117*	.062*	.068*	.187*	.178*	.311	.474	.538	.561	-

\* Correlations below .195 are not significant at 5% level.

1948 Q.E. {  
 $x_1$  = Intelligence Test  
 $x_2$  = English Comp.  
 $x_3$  = English Lang.  
 $x_4$  = Arithmetic

1953 S.C. {  
 $z_1$  = English Language  
 $z_2$  = English Literature  
 $z_3$  = French  
 $z_4$  = Maths (alternative)  
 $z_5$  = Physics  
 $z_6$  = Chemistry

TABLE 37/

TABLE 37: Sample Correlations of 1948 Q.E. and 1953 S.C. - GIRLS.

	$x_1$	$x_2$	$x_3$	$x_4$	$z_1$	$z_2$	$z_3$	$z_4$	$z_5$	$z_6$
$x_1$	-	.317	.541	.376	.400	.283	.190*	.281	.123*	.128*
$x_2$	.317	-	.409	.274	.353	.284	.316	.106*	.150*	.077*
$x_3$	.541	.409	-	.430	.416	.321	.254	.150*	.050*	.092*
$x_4$	.376	.274	.430	-	.147*	.083*	.103*	.391	.075*	.117*
$z_1$	.400	.353	.416	.147*	-	.475	.429	.221	.364	.177*
$z_2$	.283	.284	.321	.083*	.475	-	.487	.259	.278	-.022*
$z_3$	.190*	.316	.254	.103*	.429	.487	-	.356	.319	.002*
$z_4$	.281	.106*	.150*	.391	.221	.259	.356	-	.331	.060*
$z_5$	.123*	.150*	.050*	.075*	.364	.278	.319	.331	-	.044*
$z_6$	.128*	.077*	.092*	.117*	.177*	-.022*	.002*	.060*	.044*	-

\* Correlations below .195 are not significant at 5% level.

1948 Q.E.	$x_1$ = Intelligence Test	1953 S.C.	$z_1$ = English Language
	$x_2$ = English Comp.		$z_2$ = English Literature
	$x_3$ = English Language		$z_3$ = French
	$x_4$ = Arithmetic		$z_4$ = Maths (traditional)
			$z_5$ = Geography
			$z_6$ = Domestic Science

Dealing first with the intercorrelations of the Q.E. tests, we find that they are very similar to the corresponding results obtained in Part I (Tables 4 & 5).

The/



highest figure for boys again occurs for English Composition with English Language, but for girls Intelligence and English Language correlate best. These correlations agree with the figures (Table 38) quoted in the Advisory Council's Report.

TABLE 38: Intercorrelations of 1948 Q.E. variables for 320 Co. Antrim pupils who later sat 1953 S.C. \*

	x <sub>1</sub>	x <sub>2</sub>	x <sub>3</sub>	x <sub>4</sub>
Intelligence Test x <sub>1</sub>	-	.35	.51	.42
English Composition x <sub>2</sub>	.35	-	.50	.32
English Language x <sub>3</sub>	.51	.50	-	.39
Arithmetic x <sub>4</sub>	.42	.32	.39	-

In S.C., the two English subjects and French correlate relatively well with one another for both sexes, and for boys, Maths, Physics and Chemistry are also correlated. None of the correlations of Domestic Science with the other S.C. variables is significant.

The intercorrelations of the Q.E. and S.C. variables are rather low. Nevertheless the English tests in Q.E. have relatively good correlations with the S.C. language subjects, and Q.E. Arithmetic correlates best with S.C. Maths. It is noteworthy that none of the Q.E. tests has a significant correlation with Geography or Domestic Science.

\* Second Report, op. cit., H.M.S.O.1955.

The pooling square was used to calculate the correlations of the Q.E. tests and several composite criteria. In the first instance, all six S.C. subjects, equally weighted, were used as the criterion.

TABLE 39: Pooled Sample Correlations of Q.E. variables with all six S.C. subjects.  
( $z_1 + z_2 + z_3 + z_4 + z_5 + z_6$ , equally weighted.)

	BOYS	GIRLS
Intelligence Test ( $x_1$ )	.293	.381
English Composition ( $x_2$ )	.234	.349
English Language ( $x_3$ )	.244	.349
Arithmetic ( $x_4$ )	.302	.249
Q.E. ( $x_1+x_2+x_3+x_4$ , equally weighted)	.354	.450

Note: 1. ( $x_1+x_2+x_3+x_4$ ) is the sum of scores in all four Q.E. tests, equally weighted.

2. ( $z_4, z_5$  &  $z_6$ ) refer to different subjects for boys and girls. See Table 33.

In the boys' results (Table 39) the highest correlations with S.C. are for Arithmetic and Intelligence. The girls' results show Intelligence to have the highest, and Arithmetic the lowest correlation with the criterion.

The total scores in English Composition, English Language and Arithmetic, weighted in the proportion of 1:2:2 /

gave correlations of .333 for boys, and .396 for girls. When the Intelligence Test was included and weights of 1:1:2:2 ( for  $x_1$ ,  $x_2$ ,  $x_3$ , and  $x_4$ ) used, the correlations were found to be .352 for boys and .435 for girls, figures which are not significantly different from those in Table 39 which resulted from using equally weighted scores.

Correlations were next calculated for the Q.E. variables with a criterion consisting of English Language, English Literature and French, the subjects which were common to boys and girls. (Table 40).

TABLE 40: Pooled Sample Correlations of Q.E. variables with S.C. Languages  
( $z_1 + z_2 + z_3$ , equally weighted.)

	BOYS	GIRLS
Intelligence Test ( $x_1$ )	.277	.363
English Composition ( $x_2$ )	.249	.396
English Language ( $x_3$ )	.306	.412
Arithmetic ( $x_4$ )	.196	.139
Q.E. ( $x_1 + x_2 + x_3 + x_4$ ), equally weighted)	.339	.444

For both boys and girls the Q.E. English tests and the Intelligence Test have much higher correlations with the language criterion than Q.E. Arithmetic. Apart from the latter, the girls' results are higher than the boys', /

and the correlation of total scores in Q.E. with this language criterion is better for girls than for boys. Similar results were obtained when the criterion consisted of J.C. languages viz. English + Latin + French (Table 7).

A third set of pooled correlations was calculated for the boys, the composite criterion consisting of S.C. Maths, Physics and Chemistry.

TABLE 41: Pooled Sample Correlations of Q.E. variables with S.C. Maths, Physics and Chemistry ( $z_4 + z_5 + z_6$ , equally weighted.)

	BOYS
Intelligence Test ( $x_1$ )	.226
English Composition ( $x_2$ )	.154
English Languages ( $x_3$ )	.117
Arithmetic ( $x_4$ )	.317
Q.E. ( $x_1 + x_2 + x_3 + x_4$ , equally weighted.)	.268

Q.E. Arithmetic and Intelligence have higher correlations than the Q.E. English tests, with a Maths. and Science criterion.

The correlation coefficients are all rather small. It must be remembered, however, that the samples from which the statistics have been derived are highly selected groups; and secondly that an interval of five years/



separates the examinations. Nevertheless, the results do fulfil expectations and confirm what has already been observed in Part I. The Q.E. English tests show a greater degree of concordance with languages in S.C. than does Q.E. Arithmetic; but Q.E. Arithmetic has higher correlations with S.C. Maths and Science than have the Q.E. English tests. The Intelligence Test correlates relatively well with both criteria, and with S.C. in toto, thus staking a further claim to be used for selecting pupils for grammar schools.

(7) Regression Coefficients and Multiple Correlations in Sample.

To judge the relative effectiveness of the Q.E. tests in predicting the criterion, the regression coefficients were calculated. These were then used as weights to give the multiple correlations.

TABLE 42: Regression Coefficients and Multiple Correlations in Sample.

Regression of Criterion on	Criterion of 6 S.C. subjects ( $z_1+z_2+z_3+z_4+z_5+z_6$ )		Criterion of S.C. Languages ( $z_1+z_2+z_3$ )		Criterion of ( $z_4+z_5+z_6$ )
	BOYS	GIRLS	BOYS	GIRLS	BOYS
Intelligence Test ( $x_1$ )	.1616	.2322	.1438	.1849	.1332
English Comp. ( $x_2$ )	.0741	.2147	.0951	.2649	.0335
English Language ( $x_3$ )	.0528	.1117	.1788	.2518	-.0805
Arithmetic ( $x_4$ )	.1828	.0548	.0242	-.1117	.2808
Multiple Correlations ( $r_m$ )	.364	.465	.351	.510	.339

These results again testify to the predictive value of the Intelligence Test. The multiple correlations show very little improvement on the pooled correlations obtained using equal weights and would not justify the labour involved in using the regression coefficients to weight the Q.E. scores.

Only/

for the language criterion are the results for boys and girls comparable. The results are in agreement except as regards English Composition which has no predictive value for boys but is important for girls.

(8) Influence of Selection.

The statistics so far have referred to a sample of pupils which has been subjected to several selective influences similar to those present in the Part I sample. As a result, the standard deviations of the variables and their intercorrelations have been reduced, and this in turn has affected the regression coefficients. Since the effect of selection will not be evenly distributed,<sup>the</sup>/relative predictive values of the Q.E. variables will not be truly reflected in the regression coefficients for the sample.

The correction for selection technique used in Part I was again employed to give estimates of the statistics which would obtain in the school population from which the sample was drawn. The correction was based on the representative sample used in Part I (Table 9).



(9) Standard Deviations and Correlations in Population.TABLE 43: Standard Deviations and Correlations in Population - BOYS

	$x_1$	$x_2$	$x_3$	$x_4$	$z_1$	$z_2$	$z_3$	$z_4$	$z_5$	$z_6$
$x_1$	-	.641	.706	.676	.381	.303	.392	.389	.355	.214
$x_2$	.641	-	.763	.716	.380	.333	.366	.333	.362	.187
$x_3$	.706	.763	-	.749	.389	.376	.415	.317	.333	.198
$x_4$	.676	.716	.749	-	.288	.320	.414	.509	.376	.274
$z_1$	.381	.380	.389	.288	-	.505	.451	.267	.296	.228
$z_2$	.303	.333	.376	.320	.505	-	.487	.334	.429	.352
$z_3$	.392	.366	.415	.414	.451	.487	-	.464	.434	.507
$z_4$	.389	.333	.317	.509	.267	.334	.464	-	.575	.565
$z_5$	.355	.362	.333	.376	.296	.429	.434	.575	-	.585
$z_6$	.214	.187	.198	.274	.228	.352	.507	.565	.585	-
$\sigma$	11.17	22.85	41.06	49.62	43.89	49.37	54.33	63.22	56.82	51.58

1948  
Q.E.

$x_1$  = Intelligence Test  
 $x_2$  = English Comp.  
 $x_3$  = English Language  
 $x_4$  = Arithmetic

1953  
S.C.

$z_1$  = English Language  
 $z_2$  = English Literature  
 $z_3$  = French  
 $z_4$  = Maths (alternative)  
 $z_5$  = Physics  
 $z_6$  = Chemistry

TABLE 44: /

TABLE 44: Standard Deviations and Correlations in  
Population - GIRLS.

	$x_1$	$x_2$	$x_3$	$x_4$	$z_1$	$z_2$	$z_3$	$z_4$	$z_5$	$z_6$
$x_1$	-	.547	.714	.621	.535	.401	.322	.423	.173	.193
$x_2$	.547	-	.657	.585	.506	.407	.424	.300	.197	.156
$x_3$	.714	.657	-	.722	.562	.441	.387	.360	.127	.177
$x_4$	.621	.585	.722	-	.392	.284	.289	.518	.145	.194
$z_1$	.535	.506	.562	.392	-	.542	.499	.340	.382	.225
$z_2$	.401	.407	.441	.284	.542	-	.537	.346	.302	.030
$z_3$	.322	.424	.387	.289	.499	.537	-	.428	.341	.050
$z_4$	.423	.300	.360	.518	.340	.346	.428	-	.353	.113
$z_5$	.173	.197	.127	.145	.382	.302	.341	.353	-	.063
$z_6$	.193	.156	.177	.194	.225	.030	.050	.113	.063	-
$\sigma$	11.66	18.70	38.24	46.89	41.05	51.68	59.00	70.09	42.20	36.64

1948  
Q.E.

$\left\{ \begin{array}{l} x_1 = \text{Intelligence Test} \\ x_2 = \text{English Comp.} \\ x_3 = \text{English Language} \\ x_4 = \text{Arithmetic} \end{array} \right.$

1953  
S.C.

$\left\{ \begin{array}{l} z_1 = \text{English Language} \\ z_2 = \text{English Literature} \\ z_3 = \text{French} \\ z_4 = \text{Maths (traditional)} \\ z_5 = \text{Geography} \\ z_6 = \text{Domestic Science} \end{array} \right.$

Tables 43 and 44 show that the standard deviations in the population are considerably higher than in the sample. The variations noted in the sample still persist.

The/

population intercorrelations of the Q.E. tests are considerably lower than the corresponding figures in Part I (cf. Tables 10 & 11). One would have expected closer agreement. It must be remembered, however, that the S.C. sample is even more highly selected than the J.C. sample, and it may be that some of these selective influences are correlated with the criterion. If this is the case, the correction technique has been wrongly used. We did, however, make the only practicable assumption that the influences determining selection were of a random nature.

The intercorrelations of the S.C. subjects again show the similarity which exists among the languages, and, for the boys, among the mathematical and scientific subjects. Domestic Science has nothing in common with any of the other S.C. subjects except English Language, and even here the correlation coefficient is very small.

Although the population correlations of the Q.E. variables with the S.C. subjects are higher than for the sample, they are still somewhat small. It is unlikely that the lapse of five years is alone responsible for this, for in a similar inquiry on examinations in  
 \*  
 Cheshire the predicting variables gave correlations of as much as 0.83 with some of the tests in the criterion.

There/

\* The results of this inquiry, which was carried out by the staff of Room 70, Moray House, have not been published.

is, however, an interesting sex difference which appears in both investigations. The predicting variables correlate better with English Language and English Literature for girls than for boys, but the reverse is true for French. Furthermore, among the intercorrelations of the criterion subjects in both investigations French gives a relatively high correlation with Arithmetic, and the figure for boys is higher than for girls. In Emmett and Wilmut's follow-up\*, Arithmetic again had a high correlation with School Certificate French, but the relative performance of the sexes was not recorded.

Pooled correlations were first calculated for the Q.E. tests with the sums of scores in all S.C. subjects, equally weighted.

TABLE 45: Pooled Population Correlations of Q.E. variables with all S.C. subjects.  
( $z_1 + z_2 + z_3 + z_4 + z_5 + z_6$ , equally weighted.)

	BOYS	GIRLS
Intelligence Test ( $x_1$ )	.467	.527
English Comp. ( $x_2$ )	.450	.512
English Language ( $x_3$ )	.466	.528
Arithmetic ( $x_4$ )	.501	.469
( $x_1 + x_2 + x_3 + x_4$ )	.533	.595

Strictly/

\* Emmett, W.G., and Wilmut, F.S., op. cit.



speaking, comparisons between the sexes are not valid but it does appear that Q.E. as a whole correlates better with the girls' criterion than with the boys. Within the sexes Arithmetic gives the highest correlation with S.C. for boys, while English Language has the highest correlation for girls.

The Advisory Council's Report<sup>+</sup> includes estimated population correlations for the Q.E. tests with the sum of the six highest scores in S.C. The figures quoted there are higher than in the present inquiry (viz.  $r_{x_1.SC} = .63$ ,  $r_{x_2.SC} = .49$ ,  $r_{x_3.SC} = .64$ ,

$r_{x_4.SC} = .64$ ) but English Composition gives the lowest reading, a fact which agrees with the boys' results above.

The pooled correlations of Q.E. with the language criterion (which was common to both sexes) were calculated.

TABLE 46: Pooled Population Correlations of Q.E. variables with S.C. Languages  
( $z_1 + z_2 + z_3$ , equally weighted.)

	BOYS	GIRLS
Intelligence Test ( $x_1$ )	.444	.507
English Comp. ( $x_2$ )	.445	.539
English Language ( $x_3$ )	.486	.560
Arithmetic ( $x_4$ )	.421	.389
( $x_1 + x_2 + x_3 + x_4$ )	.433	.583

+ Second Report, op. cit. H.M.S.O. 1955.



The results in Table 46 show a remarkable similarity to the figures obtained for a language criterion in J.C. (Part I § 9.) The order of merit is almost the same; the girls' scores correlate better than the boys' except for Arithmetic; English Language gives the highest result; and the correlation of Q.E. as a whole with the criterion is higher for girls than for boys.

S.C. Maths. + Physics + Chemistry were then regarded as forming a criterion, and the pooled correlations of Q.E. with it were calculated.

TABLE 47: Pooled Population Correlations of Q.E. variables with S.C. Maths, Physics and Chemistry ( $z_4 + z_5 + z_6$  equally weighted.)  
- Boys only.

	BOYS
Intelligence Test ( $x_1$ )	.377
English Comp. ( $x_2$ )	.347
English Language ( $x_3$ )	.334
Arithmetic ( $x_4$ )	.456
( $x_1 + x_2 + x_3 + x_4$ )	.428

As was the case with J.C. maths., Arithmetic and the Intelligence Test have the highest correlations with the maths. + science criterion.

(10) The Relative Predictive Values of the Q.E. Variables.

Estimates of the population regression coefficients were calculated to determine the relative predictive merits of the Q.E. tests. By using the regression coefficients as weights, the multiple correlations ( $r_m$ ) were obtained.

(a) Prediction of S.C. ( $z_1 + z_2 + z_3 + z_4 + z_5 + z_6$ )

TABLE 48: Population Regression Coefficients for Q.E. variables and S.C.

Regression of Criterion on	BOYS	GIRLS
Intelligence Test ( $x_1$ )	.1821	.2508
English Comp. ( $x_2$ )	.0950	.2414
English Language ( $x_3$ )	.0739	.1390
Arithmetic ( $x_4$ )	.2546	.0715
	$r_m = .538$	$r_m = .602$

For boys, the Arithmetic and Intelligence Tests are involved in predicting S.C. success, while for girls, Arithmetic takes no part in the prediction. The differences between the sexes have arisen from the different subjects forming the criteria, the girls' battery containing only one subject of a mathematical nature as against three for the boys (viz. Maths, Physics and Chemistry.) Nevertheless, it is surprising that/

the presence of three language subjects in the boys' battery has not thrown some of the work of prediction on to the Q.E. English tests.

(b) Prediction of S.C. Languages ( $z_1 + z_2 + z_3$ )

TABLE 49: Population Regression Coefficients for Q.E. Variables and S.C. Languages.

Regression of Criterion on	BOYS	GIRLS
Intelligence Test ( $x_1$ )	.1645	.2010
English Comp. ( $x_2$ )	.1240	.3009
English Language ( $x_3$ )	.2497	.3243
Arithmetic ( $x_4$ )	.0344	-.1459
	$r_m = .514$	$r_m = .624$

English Language is the best predictor of performance in S.C. languages, but the Intelligence and English Composition tests also join in the prediction. Arithmetic takes no part. The boys' results agree fairly well with the girls'. The multiple correlation for girls is higher than for boys, a feature which also emerges from the J.C. statistics (Table 14.)

In other respects the present results show a considerable departure from Part I. This is due to the different subjects included in the criterion; J.C. Latin Languages consisted of English, and French, while S.C. Languages consisted of English Language, English Literature and French.

(c)/

(c) Prediction of S.C. Maths + Science ( $z_4 + z_5 + z_6$ )  
BOYS only.

TABLE 50: Population Regression Coefficients for  
Q.E. Variables and S.C. Maths.+ Science.

Regression of Criterion on	BOYS
Intelligence Test ( $x_1$ )	.1550
English Comp. ( $x_2$ )	.0446
English Language ( $x_3$ )	-.1119
Arithmetic ( $x_4$ )	.4036
$r_m = .470$	

It was to be expected that Q.E. Arithmetic would provide the best prediction of success in S.C. Maths.+ Physics + Chemistry. The Intelligence Test plays a minor role in the prediction but both English tests are absent. This is very similar to the results obtained for the prediction of J.C. Maths.(i.e. Arithmetic, Algebra and Geometry), but the multiple correlation for the latter was much higher than the present figure.

(d) /



## (d) Prediction of Separate Subjects in S.C.

## (i) S.C. English Language.

TABLE 51: Population Regression Coefficients for Q.E. Variables and S.C. English Language.

Regression of S.C. Eng. Language on	BOYS	GIRLS
Intelligence Test ( $x_1$ )	.2146	.2653
English Comp. ( $x_2$ )	.1966	.2319
English Language ( $x_3$ )	.1936	.3211
Arithmetic ( $x_4$ )	-.1423	-.1398
	$r_m = .437$	$r_m = .620$

The prediction of S.C. English Language depends on the Intelligence and English tests in Q.E., Arithmetic taking no part in the prediction. For boys the Intelligence Test does most of the work, but for girls it is Q.E. English Language test. The girls' results accord closely with those found for the prediction of J.C. English. The sex-difference in multiple correlation provides another point of similarity with Part I, the figure for girls far exceeding that for boys.

## (ii) S.C. English Literature

TABLE 52:/

TABLE 52: Population Regression Coefficients for Q.E. Variables and S.C. English Literature.

Regression of S.C. Eng. Literature on	BOYS	GIRLS
Intelligence Test ( $x_1$ )	.0444	.1758
English Comp. ( $x_2$ )	.0836	.2123
English Language ( $x_3$ )	.2477	.2902
Arithmetic ( $x_4$ )	.0446	-.1587
	$\bar{r}_m = .386$	$\bar{r}_m = .490$

Q.E. English Language alone predicts success in S.C. English Literature for boys, but for girls Q.E. Intelligence, English Composition and English Language all contribute to the prediction. \* Something similar occurred in the Cheshire follow-up ; for the boys it was the Moray House English test which predicted success in English Literature, but for girls both Intelligence and English joined in the prediction.

The multiple correlation for girls again exceeds that for boys, a feature which also occurred in the Cheshire inquiry.

(iii) S.C. French.

TABLE 53: /

\* The results of this investigation have not been published.

TABLE 53: Population Regression Coefficients for Q.E. Variables and S.C. French.

Regression of S.C. French on	BOYS	GIRLS
Intelligence Test ( $x_1$ )	.1403	.0574
English Comp. ( $x_2$ )	.0207	.3026
English Language ( $x_3$ )	.1647	.1933
Arithmetic ( $x_4$ )	.1807	-.0636
	$\bar{r}_m = .454$	$\bar{r}_m = .451$

For boys, Arithmetic, English Language and the Intelligence Test, in that order, do the work of predicting performance in S.C. French. The prediction for girls, however, depends on English Composition and, to a lesser extent, English Language.

It was noticed earlier that Q.E. Arithmetic took part in the prediction of J.C. French, for boys. The above results seem to confirm the hypothesis that the learning of French by boys depends to some extent on a mathematical approach similar to that involved in the learning of Arithmetic. Since the author was unable to find any evidence in other research work to substantiate this, it must remain 'sub iudice.'

(iv) S.C. Mathematics (alternative) - Boys.

TABLE 54:/

TABLE 54: Population Regression Coefficients for Q.E. Variables and S.C. Maths (alt.)

Regression of S.C. Maths (alt.) on	BOYS
Intelligence Test ( $x_1$ )	.1662
English Comp. ( $x_2$ )	-.0187
English Language ( $x_3$ )	-.2114
Arithmetic ( $x_4$ )	.5686
	$r_m = .530$

The prediction of S.C. Maths.(alternative) is being carried out by Q.E. Arithmetic, assisted to some extent by the Intelligence Test. Neither of the English tests take part in the prediction.

The regression of Maths.on English Language is significantly negative, showing that the prediction value of the Q.E. battery, so far as S.C. Maths.(alt.) is concerned, would be improved by discounting the English Language scores.

(v) S.C. Physics - Boys

TABLE 55:/



TABLE 55: Population Regression Coefficients for Q.E. Variables and S.C. Physics.

Regression of S.C. Physics.	BOYS
Intelligence Test ( $x_1$ )	.1527
English Comp. ( $x_2$ )	.1575
English Language ( $x_3$ )	-.0353
Arithmetic ( $x_4$ )	.1868
	$r_m = .412$

The scores in Intelligence, English Composition and Arithmetic combine in the prediction of performance of S.C. Physics. This result is understandable since both verbal and mathematical abilities participate in the answering of the Physics paper. This contention is not supported by Emmett and Wilmot\* who found that I.Q. gave the best prediction of School Certificate Physics, that A.Q. also took part in the prediction, but that E.Q. gave a negative regression coefficient.

(vi) S.C. Chemistry - Boys.

TABLE 56:/

\* Emmett, W.G., and Wilmot, F.S., op. cit.

TABLE 56: Population Regression Coefficients for Q.E. Variables and S.C. Chemistry.

Regression of S.C. Chemistry on	BOYS
Intelligence Test ( $x_1$ )	.0748
English Compos. ( $x_2$ )	-.0258
English Language ( $x_3$ )	-.0376
Arithmetic ( $x_4$ )	.2700
$\tilde{r}_m = .279$	

Q.E. Arithmetic alone is responsible for the prediction of S.C. Chemistry. Emmett and Wilmut's results showed that Intelligence and Arithmetic both took part in the prediction. Their results must command the greater respect since they obtained a multiple correlation of .660 which is much superior to the figure of .279 recorded in the present inquiry. This correlation is so low as to render the prediction of S.C. Chemistry untrustworthy.

(vii) S.C. Mathematics (traditional) - Girls.

TABLE 57:/

TABLE 57: Population Regression Coefficients for  
Q.E. Variables and S.C. Maths.(trad.)

Regression of S.C. Maths.on	GIRLS
Intelligence Test ( $x_1$ )	.2361
English Comp. ( $x_2$ )	-.0162
English Language ( $x_3$ )	-.1525
Arithmetic ( $x_4$ )	.4905
	$r_m = .542$

As was the case for Maths.(alternative), scores in Q.E. Arithmetic and Intelligence Tests predict success in S.C. Maths.(traditional). Neither of the English tests take part in the prediction, and again the regression coefficient for English Language is strongly negative.

(viii) S.C. Geography - Girls.

TABLE 58:/

TABLE 58: Population Regression Coefficients for Q.E. Variables and S.C. Geography.

Regression of S.C. Geography on	GIRLS
Intelligence Test ( $x_1$ )	.1317
English Comp. ( $x_2$ )	.1729
English Language ( $x_3$ )	-.1113
Arithmetic ( $x_4$ )	.0426
$r_m = .221$	

The prediction of S.C. Geography depends on scores in the Intelligence and English Composition tests. In J.C. it was the Intelligence and English Language scores which predicted success in Geography.

The multiple correlation is low, which reflects the unsatisfactory nature of the prediction.

(ix) S.C. Domestic Science - Girls.

TABLE 59:/



TABLE 59: Population Regression Coefficients for  
Q.E. Variables and S.C. Dom. Science.

Regression of S.C. Domestic Science on	GIRLS
Intelligence Test ( $x_1$ )	.1083
English Comp. ( $x_2$ )	.0348
English Language ( $x_3$ )	-.0008
Arithmetic ( $x_4$ )	.1070
$r_m = .214$	

The prediction of Domestic Science scores is also unsatisfactory. Although none of the regression coefficients is significant, it seems that the scores in the Intelligence and Arithmetic tests come nearest to providing an estimate of later performance in Domestic Science.

(11) Factorial Analysis.

A factorial analysis of Q.E. and S.C., similar to that in Part I, was undertaken in the hope that it might suggest possible improvements to the selecting battery.

## (a) Centroid Analysis.

As in Part I, the centroid method\* was used to analyse the sample correlations of boys and girls. The communalities inserted in the diagonal cells were estimated by the "centroid method". † Four significant factors were extracted for boys and for girls.

TABLE 60: Centroid Factor Loadings - BOYS (N=162)

		I	II	III	IV	Obt. $h^2$	Estimated $h^2$
Intelligence 1.		.5381	.3782	.0227	.1241	.4485	.4448
Eng. Comp. 2.		.4896	.4278	-.0859	-.1238	.4454	.4431
Eng. Lang. 3.		.5310	.4896	-.1604	-.0942	.5563	.5067
Arithmetic 4.		.5266	.3316	.2103	.0893	.4395	.4100
Eng. Lang. 5.		.4918	-.1108	-.4426	.1236	.4653	.4435
Eng. Liter. 6.		.5435	-.2634	-.3423	-.0175	.4822	.4718
French 7.		.6105	-.2492	-.0999	.0763	.4506	.4577
Maths (alt.) 8.		.5893	-.2550	.4355	.2113	.6466	.5500
Physics 9.		.6128	-.3025	.2177	-.2638	.5840	.5500
Chemistry 10.		.5566	-.4466	.2313	-.0525	.5655	.5600

\* Thurstone, L.L., "Multiple Factor Analysis", Ch. 11.

† Thurstone, L.L., op. cit., Chapter 13.

TABLE 61: Centroid Factor Loadings - GIRLS (N=186)

		I	II	III	IV	Obt. h <sup>2</sup>	Estimated h <sup>2</sup>
Intelligence	1.	.6183	-.3115	-.0365	-.0752	.4863	.5350
Eng. Comp.	2.	.5153	-.1528	.2220	.0209	.3386	.3600
Eng. Lang.	3.	.6311	-.4005	.1918	.0471	.5977	.5750
Arithmetic	4.	.4748	-.3729	-.2867	.2578	.5131	.4400
Eng. Lang.	5.	.6806	.0988	.1298	-.2736	.5647	.5100
Eng. Liter.	6.	.5744	.3139	.2774	.0538	.5083	.5000
French	7.	.5800	.3863	.1808	.1868	.5532	.5200
Maths. (trad)	8.	.5001	.1532	-.4355	.2240	.5134	.4100
Geography	9.	.4080	.3952	-.1525	-.1110	.3582	.3600
Dom. Science	10.	.1490	-.1099	-.0902	-.2137	.0881	.0900

There is close agreement between the obtained communalities and the estimated figures, making any reiteration of the process unnecessary. Most of the communalities are satisfactorily high. For boys, the common factors account for a major portion of the total test variance in each case. For girls, however, there is one notable exception viz. Domestic Science. The small communality indicates that the answering of the Domestic Science paper does not involve the four factors common to the other tests in the battery. This is understandable since Domestic Science is unlike any of the other tests.

(b)/

## (b) Rotation of Axes.

The factor axes were rotated "two by two" keeping them orthogonal,\* in preference to the more cumbersome oblique method used in Part I. The rotations were carried out in the following order:-

Boys :  $I_0$  and  $II_0$ , making  $I_1$ , pass through Test 9.

$I_1$  and  $III_0$ , making  $I_2$ , pass through Test 3.

$I_2$  and  $IV_0$ , making  $I_3$  pass through Test 9.

The corresponding factor axes for girls were rotated in the same order to begin with, but it was discovered eventually that a better solution resulted from rotating them as follows:-

Girls :  $I_0$  and  $II_0$ , making  $II_1$  pass through Test 6.

$II_1$  and  $III_0$ , making  $III_1$  pass through Test 3.

$II_2$  and  $IV_0$ , making  $IV_1$  pass through Test 7.

Diagrams illustrating the positions of the factor axes before and after rotation are given in Appendix F.

## (c) Psychological Interpretation of Factors.

TABLE 62:/

\* Thomson, G.H., "The Factorial Analysis of Human Ability", Chapter 16,5.



TABLE 62: Final Factor Loadings after Rotation - Boys.

		I <sub>3</sub>	II <sub>1</sub>	III <sub>1</sub>	IV <sub>1</sub>
Intelligence Test	1.	.1619	.5773	.1850	.2340
Eng. Comp.	2.	.2851	.6003	.0582	.0189
Eng. Lang.	3.	.3119	.6740	.0000	.0680
Arithmetic	4.	.1008	.5304	.3499	.1595
Eng. Lang.	5.	.5046	.1183	-.1188	.4271
Eng. Liter.	6.	.6125	.0044	.0263	.3260
French	7.	.4952	.0467	.2608	.3675
Maths. (alt.)	8.	.1716	.0322	.7075	.3397
Physics	9.	.5362	.0000	.5444	.0000
Chemistry	10.	.4359	-.1541	.5630	.1860

TABLE 63: Final Factor Loadings after Rotation - Girls.

		I <sub>1</sub>	II <sub>3</sub>	III <sub>1</sub>	IV <sub>1</sub>
Intelligence Test	1.	.5698	.2119	.3303	.0871
Eng. Comp.	2.	.3812	-.0279	.4387	.0033
Eng. Lang.	3.	.6541	-.0312	.4095	.0353
Arithmetic	4.	.5549	.1022	.0758	.4348
Eng. Lang.	5.	.2397	.3216	.6303	-.0807
Eng. Liter.	6.	.0000	.0104	.7083	.0810
French	7.	-.0609	.0000	.6980	.2495
Maths. (trad.)	8.	.1054	.3192	.2486	.5818
Geography	9.	-.1512	.3665	.4123	.1762
Dom. Science	10.	.1679	.2287	.0268	-.0829



Boys' results:

Factor I is a verbal factor. It is present in the two English tests in Q.E. and in S.C. English and French. Physics and Chemistry, which require verbal answers, also have high loadings in this factor.

Factor II is present in all Q.E. tests but absent from all S.C. subjects. This corresponds to the "temporal" factor noted in the factorial analysis in Part I.

The mathematical subjects in both Q.E. and S.C. have high loadings in Factor III. This factor is important for success not only in Q.E. Arithmetic and S.C. Maths., but also in S.C. Physics and Chemistry.

Factor IV is present in S.C. English Language, English Literature, French and Mathematics but absent from the other tests. It is difficult to find a satisfactory psychological interpretation of this factor for, although there is a linguistic unity underlying the first three, this cannot be extended to include mathematics.

Girls' results:

The four Q.E. tests have high loadings in Factor I while the loadings of the S.C. subjects are small. This is a "temporal" factor similar to Factor II for boys.

Factor II is present in S.C. English Language, Maths., and Geography. Without further research it is impossible/

to explain this factor in psychological terms.

Factor III is clearly a verbal factor. In the Q.E. battery, the Intelligence Test and both English tests have high loadings in this factor; and of the S.C. subjects English Language, English Literature, French and Geography all have high loadings.

Q.E. Arithmetic and S.C. Mathematics are the only subjects with loadings in Factor IV leading to the conclusion that it is a mathematical factor.

The results of the factorial analysis seem to suggest that the prediction provided by the Q.E. is fairly satisfactory for boys. Each of the S.C. subjects has a high loading in one or more factors which are also adequately measured at the Q.E. level. The only possible ground for suspicion relates to Factor IV which is present in four subjects in S.C. but in no Q.E. test. The predictive efficiency of the Q.E. battery could be improved by including a test which measures Factor IV.

Something similar has occurred for girls. Factor II is present in three of the S.C. subjects but is absent from the Q.E. battery. More disturbing, however, is the fact that Domestic Science is not being measured by any of the factors, and shares no common link with any of the Q.E. tests. This indicates the need for a test in the Q.E. battery capable of predicting success in Domestic Science.

PART III.

A STUDY OF THE RELATIVE PERFORMANCE OF DIFFERENT  
GROUPS OF CANDIDATES IN 1954 QUALIFYING EXAMINATION.

(1) Object and Scope.

The follow-up inquiries of Parts I and II were based on the results of the Q.E. held in 1948. To bring the work up to date, a study of the 1954 Q.E. results was undertaken. Pupils were classified according to the type of primary school which they attended, and the performance of each group was examined. As before, the sexes were treated separately.

(2) Qualifying Examination, 1954.

In 1954, Q.E. consisted of two Moray House Intelligence Tests, given at six weeks' interval, two English papers and an Arithmetic paper. Both Intelligence Tests had been standardised on large groups of 11+ children in Great Britain to yield a mean I.Q. of 100 and a standard deviation of 15. The attainments tests\* were locally constructed; each English test had a maximum score of 150, and the Arithmetic test had a maximum score of 200. The combined English mark and the Arithmetic mark were weighted in the ratio of 3:2.

Pupils were qualified, in the first instance, on their total scores in the attainments tests. Those with totals of 300 or more were admitted to grammar schools; those with totals below 250 were rejected. Each Education Authority was left to make its own arrangements for dealing with the "border-line" group (i.e. those with scores between 250 and 299.) Most Authorities made use of the higher of the two I.Q.'s in deciding the fate of the "border-line" candidates.

A total of 11,254 candidates entered for the 1954 Q.E. These pupils were submitted on the advice of their teachers, or in accordance with their parents' wishes. Altogether 3,855 candidates were awarded places in grammar schools on the results of Q.E.

The upper age - limit for Q.E. candidates was 12:3 on 1st June, 1954 and although the lower age - limit was set/

\* Copies of the Q.E. English and Arithmetic papers are included in Appendix B.



at 10:3, over 85 per cent of the candidates were in fact above 11:0.

### (3) The Method.

The results in this section of the investigation are based on the scores of 1925 pupils drawn at random from the total number of candidates. The sex and age of each candidate, together with his scores in Q.E. (the higher I.Q. was included) were entered on a card. The card also gave the following information about the primary school which the pupil attended:-

- a) the name of the Education Authority responsible for the school.
- b) the type of area in which the school was situated i.e. "urban" or "rural".
- c) the type of governing body responsible for the school i.e. "county" (state-controlled) or "voluntary"(privately - controlled.)

These cards were then sorted into various categories, and by calculating the mean scores for each group of cards, it was possible to compare the performances of pupils in the different categories.

(4) Differences in Standard of Selection.

Mean scores in Q.E. were calculated for each of the eight Education Authorities (Table 64). Code letters are used to prevent invidious comparisons.

TABLE 64: Mean Scores in Q.E. Education for Authorities - BOYS and GIRLS.

Educ. Auth.	Num. of Pupils	Mean Age	Mean Scores				
			I.Q.	Eng.1.	Arith.	Eng.2.	Eng.1 + Arith. + Eng.2.
A.	248	11:6.20	112.11	65.68	92.11	68.53	226.32
B.	241	11:6.32	111.27	65.72	95.16	66.97	227.85
C.	232	11:6.51	110.86	66.79	92.52	64.51	223.82
D.	244	11:6.14	109.34	64.96	90.32	67.81	223.09
E.	239	11:6.28	112.45	69.97	93.74	67.39	231.10
F.	238	11:5.59	113.45	70.80	94.35	70.44	235.59
G.	242	11:6.10	113.46	69.39	98.34	71.49	239.22
H.	241	11:6.14	113.09	70.37	92.16	69.24	231.77
All E.A's	1925	11:6.16	112.00	67.95	93.58	68.31	

Although the age of the candidates shows little variation from one Authority to another, the mean scores vary considerably. The I.Q.'s range from 109.34 for Authority D. to over 113 for F, G, and H; the differences of approximately 4 points of I.Q. are highly significant. These mean I.Q.'s may be compared with similar figures for two English Authorities where candidates for the 11+ Transfer Examination undergo a preliminary/

selection procedure. In each of the latter approximately 50 per cent of the year group enters for the examination as compared with an overall figure of 42 per cent for Northern Ireland. Over the past five years the average mean I.Q. was 110.74 for one English Authority and 109.62 for the other. These are lower than the Northern Ireland results because the English pupils are less highly selected thus allowing a greater proportion of duller children to sit the examination; and the figures may be further affected by differences in mean I.Q. between Northern Ireland and the other Education Authorities.

In the attainments tests in Q.E. (Table 64) the mean scores of C. and D. are considerably lower than those of F, G, and H. The mean total scores (i.e. English 1 + Arithmetic + English 2 ) show a difference of almost 16 marks between the extremes.

These statistics have been derived from a selected group of pupils i.e. pupils selected either by teachers or by parents as being suitable for a grammar school education. It is evident that different standards of selection are used. A greater proportion of duller pupils is allowed to enter for Q.E. in Authorities C. and D. than in F, G. and H.

(5) Sex Differences.

Table 65 gives the mean scores in each of the Q.E. tests for all boys and all girls.

TABLE 65: Mean Scores of Boys and Girls.

	Age	I.Q.	Eng.1.	Arith.	Eng.2.
Boys (N =982)	11:5.97	112.07	68.68	97.55	66.77
Girls (N =943)	11:6.34	111.93	67.18	89.45	69.92
Difference(B-G)	-0.37	0.14	1.50	8.10*	-3.15*
"t"	1.59	0.28	1.38	5.36	3.18

\* Significant at 1% level.

The sexes do not differ significantly in age, nor in their performances in the Intelligence and English 1 tests. In Arithmetic, however, the boys display a marked superiority, while in English 2, the mean score for girls is significantly higher than that for boys.

\*

Emmett, investigating sex differences in Moray House Intelligence, English and Arithmetic tests found girls to be superior in the first two and equal to the boys in Arithmetic. He points out that before 1940 there was no significant difference in Intelligence, and the boys were markedly superior in Arithmetic. This trend, he suggests, is due to a general relaxation of discipline which took place in schools/

\* Emmett, W.G., "The Trend of Intelligence in Certain Districts of England". Population Studies, 1950, 3, 324.



during the war years, girls being less likely to take advantage of lax discipline than boys.

The findings in the present inquiry agree with those which obtained in England before the war. It is very probable that the relaxation of discipline referred to by Emmett did not affect schools in Northern Ireland as greatly as those in England. For one thing, mobilisation did not take place in Northern Ireland and although many teachers volunteered for the Armed Forces, it is unlikely that school staffs were depleted to the same extent as those in Great Britain. Again, few schools in Northern Ireland felt the disturbing effects of evacuation.

In view of the differences in circumstances during the war between Northern Ireland and the rest of the United Kingdom, the results of the present inquiry seem to accord with Emmett's explanation of the recent trend of sex differences.

(6) Differences between Urban and Rural Pupils.

In forming this classification, communities of more than 1000 inhabitants were regarded as urban, and those of less than 1000 inhabitants as rural. Pupils were separated into the two categories according to the location of the primary school which they attended.

Tables 66, 67 and 68 show the mean scores in Q.E. for candidates attending urban and rural schools.

TABLE 66: Mean Scores in Q.E. for Urban and Rural Schools - (Boys)

	Age	I.Q.	Eng.1	Arith.	Eng.2.
Urban (N=706)	11:5.84	113.41	71.12	100.11	69.08
Rural (N=276)	11:6.32	108.64	62.43	91.00	60.86
Difference (U-R)	-0.48	4.77*	8.69*	9.11*	8.22*
"t"	1.28	6.14	4.96	3.83	5.09

TABLE 67: Mean Scores in Q.E. for Urban and Rural Schools - (Girls)

	Age	I.Q.	Eng.1.	Arith.	Eng.2.
Urban (N=592)	11:6.02	113.01	69.11	89.49	72.57
Rural (N=351)	11:6.86	110.12	63.93	89.39	65.45
Difference (U-R)	-0.84*	2.89*	5.18*	0.10	7.12*
"t"	2.44	3.95	3.42	0.05	5.06

TABLE 68: /

TABLE 68: Mean Scores in Q.E. for Urban and Rural Schools (Boys and Girls).

	Age	I.Q.	Eng.1.	Arith.	Eng.2.
Urban (N=1298)	11:5.92	113.23	70.21	95.27	70.67
Rural (N=627)	11:6.63	109.47	63.27	90.10	63.43
Difference (U-R)	-0.71*	3.76*	6.94*	5.17*	7.24*
"t"	2.83	7.12	6.10	3.26	6.82

\* Significant at 5% level.

The urban boys are, on the average, superior to rural boys in all four Q.E. tests (Table 66). In each case the difference between the means is significant at the 5 per cent level. The girls' results, too, show the urban group to be superior to the rural, the differences being significant for all tests except Arithmetic (Table 67.)

The interpretation of these results is complicated by the fact that the candidates for Q.E. constitute a selected group. It may be that the differences recorded above are due to the use of different standards in selecting entrants for Q.E. Teachers dealing with small numbers of pupils in rural schools are less likely to form as accurate an estimate of their pupils' abilities, relative to the school population, as teachers/

in town schools with large numbers of pupils in their charge. It is probable, then, that rural teachers recommend a greater number of duller pupils which in turn depresses the mean scores for the rural group. The Advisory Council's report\* seems to suggest this in expressing concern at the ignorance of teachers in small rural schools as to the type of pupil and standard of attainment required by grammar schools.

At the same time one must not finally discount the alternative possibility that the urban school population is superior to the rural school population. In an investigation<sup>‡</sup> dealing with the scores of over 148,000 English children, Emmett found the mean I.Q. of urban pupils to be significantly higher than that of rural pupils. When frequency distributions of the present sample were made, it was discovered that 43.7 per cent of urban children scored 115 I.Q. or over as against 30.4 per cent of rural children.

\* Second Report, op. cit., H.M.S.O., 1955.

‡ Emmett, W.G., "The Intelligence of Urban and Rural Children." Population Studies, Vol VII, No.3, 1954.



(7) Differences between County and Voluntary Schools.

The Education Authorities are responsible for the provision of educational facilities and for the staffing of "county" schools. "Voluntary" schools, on the other hand, are managed by their own governing bodies, although most of them accept certain regulations laid down by the Education Authorities in return for financial assistance.

The mean scores in Q.E. for pupils attending county and voluntary schools are given in Tables 69, 70 and 71.

TABLE 69: Mean Scores in Q.E. for County and Voluntary Schools (Boys).

	Age	I.Q.	Eng.1.	Arith.	Eng. 2.
County N = 395	11:5.88	112.95	71.71	102.30	69.57
Voluntary N = 587	11:6.03	111.48	66.65	94.35	64.88
Difference (C-V)	-0:0.15	1.47*	5.06*	7.95*	4.69*
"t"	0.45	2.01	3.17	3.57	3.15

TABLE 70: /



TABLE 70: Mean Scores in Q.E. for County and Voluntary Schools - (Girls.)

	Age	I.Q.	Eng.1.	Arith.	Eng.2.
County N = 401	11:5.79	113.10	69.60	93.58	72.09
Voluntary N = 542	11:6.74	111.07	65.39	86.40	68.31
Difference (C-V)	-0:0.95*	2.03*	4.21*	7.18*	3.78*
"t"	2.81	2.80	2.80	3.40	2.82

TABLE 71: Mean Scores in Q.E. for County and Voluntary Schools - (Boys and Girls.)

	Age	I.Q.	Eng.1.	Arith.	Eng.2.
County N = 796	11:5.83	113.02	70.65	97.91	70.84
Voluntary N = 1129	11:6.37	111.28	66.04	90.53	66.53
Difference (C-V)	-0:0.54	1.74*	4.61*	7.38*	4.31*
"t"	2.28	3.39	4.22	4.82	4.31

The voluntary school pupils are somewhat older, on the average, than county school pupils, but the latter nevertheless display a marked superiority in each of the Q.E. tests. The differences between the mean scores are significant in every instance. On making frequency distributions it was found that 44.7 per cent/

of county examinees scored 115 I.Q. or over, while 37.9 per cent of voluntary examinees reached this level. Although this would seem to reflect on the quality of the teaching in voluntary schools, it is impossible to draw any definite conclusions because of the selective nature of the groups from which the results have been derived.

SUMMARY OF PART I.

1. In 1948 candidates seeking admission to grammar schools were required to sit a Qualifying Examination consisting of a Moray House Intelligence Test and three locally constructed attainments tests viz. English Composition, English Language and Arithmetic. Selection was made on the total attainment score, the I.Q. being used only in the case of "borderline" candidates.
2. The follow-up inquiry was carried out on the scores of 479 candidates who had taken the Q.E. in 1948 and the Junior Certificate Examination in 1951.
3. The boys have a higher mean score than the girls in Q.E. Arithmetic, but the girls are superior in I.Q. and in both Q.E. English tests. In J.C. the boys have higher mean scores in Arithmetic, Geometry, Science and Drawing; the girls have higher mean scores in English, Latin and French.
4. The wide variations in the standard deviations of J.C. subjects suggests the need for a scaling procedure to render all subjects comparable.
5. Treating boys and girls separately, the intercorrelations of all variables were calculated. The pooled correlations of Q.E. with J.C., using equal weights, were .557 for boys and .584 for girls. The Intelligence and English Language tests correlate best/

with J.C. Languages, while Q.E. Arithmetic has the highest correlations with the J.C. mathematical subjects. The correlations involving English Composition are relatively low.

6. The best predictor of J.C. success for boys is Arithmetic, and for girls English Language. The Intelligence Test adds considerably to the prognosis and it is recommended that selection should take account of I.Q.

9. When the original correlations were corrected for selection, the mathematical subjects in J.C. were found to correlate very highly with one another. Correlations involving Drawing remained low. The Q.E. battery had corrected correlations with the J.C. battery of .709 (boys) and .721 (girls). The increases which resulted from using the regression coefficients as weights were negligible making the procedure unnecessary for practical purposes.

10. The following table shows the best predictors of J.C. Subjects.

J.C. Subjects	Best Q.E. Predictor	
	BOYS	GIRLS
English	Eng.Comp.&Intell.T.	Eng.Lang.& Intell.T.
Latin	Arith. & Intell.T.	Eng. Lang.
French	Intell.T. & Arith.	Eng. Lang.
History	Eng.Lang.&Eng.Comp.	Eng.Lang.&Eng.Comp.
Geography	Eng.Lang.&Intell.T.	Eng. Lang.
Arithmetic	Arith.	Arith.
Algebra	Arith.	Arith.
Geometry	Arith. & Intell.T.	Arith. & Intell.T.
Science	Arith. & Eng.Lang.	Eng.Lang. & Arith.
Drawing	Eng.Comp.& Intell.T.	Arith. & Eng.Comp.

11. A factorial analysis revealed the presence of five factors in the boys' data and four factors in the girls'. Common to both were a verbal and a mathematical factor, and a factor which was present in Q.E. but absent from most J.C. subjects. The analysis confirmed that prediction was satisfactory for boys, but for girls a factor was present in J.C. History and Geography which was not measured by any Q.E. test.



SUMMARY OF PART II.

1. In this follow-up, the 1948 Q.E. formed the predicting battery and 1953 Senior Certificate the criterion. The sample consisted of 162 boys and 186 girls. Of the criterion subjects, English Language, English Literature and French were common to both sexes. Mathematics (alternative), Physics and Chemistry were selected as the other criterion subjects for boys, and Mathematics (traditional), Geography and Domestic Science for girls.
2. The boys have higher mean scores than girls in each of the Q.E. subjects. At the S.C. level the girls are superior in two of the three subjects common to both sexes.
3. The wide range of standard deviation found among S.C. subjects invalidates the use of aggregates as the basis for awarding Certificates. A scaling procedure is needed to render all subjects comparable.
4. None of the correlations involving Domestic Science is significant, nor are the correlations of Geography with the Q.E. tests.
5. The correlation of the Q.E. battery with the S.C. battery, both equally weighted, was .354 for boys, and .450 for girls.
6. The Q.E. Arithmetic and Intelligence Tests provided the best prediction of success for the boys' battery of S.C. subjects. For girls, the best predictors were the Intelligence and English Composition tests. The multiple correlations were .364 (boys) and/

.465 (girls), figures which are not significantly better than the correlations using unweighted scores.

7. Even after correction for selection the correlations of the Q.E. variables with S.C. subjects are still very small.

8. The following table shows the best predictors of the S.C. subjects.

S.C. Subject	Best Q.E. Predictor	
	BOYS	GIRLS
English Language	Intell.T.,Eng. Comp.,Eng.Lang.	Eng.Lang.,Intell.T.,Eng.Comp.
English Literature	Eng. Lang.	Eng.Lang.,Eng.Comp.,Intell.T.
French	Arith.,Eng.Lang., Intell.T.	Eng. Comp.,Eng.Lang.
Maths.	Arith.,Intell.T.	-
Physics	Arith.,Eng.Comp.,Intell.T.	-
Chemistry	Arith.	-
Maths.	-	Arith.,Intell.T.
Geography	-	Eng.Comp.,Intell.T.
Dom.Science	-	Intell.T., Arith.

The prediction of Geography and Domestic Science was unsatisfactory.

9. The predictive value of the Q.E. battery would be enhanced by including the I.Q.

10. A factorial analysis revealed the presence of four factors for boys and four for girls. A verbal and a mathematical/

factor were identified in both sets of data. As in Part I, a factor appeared in the Q.E. tests but was absent from the later examination. The remaining factor for both boys and girls defied psychological interpretation.

11. The results of the factorial analysis seemed to suggest that the prediction of S.C. by Q.E. was satisfactory for boys. For girls, Domestic Science was not being measured by any of the Q.E. tests.

SUMMARY OF PART III.

1. The 1954 Qualifying Examination in Northern Ireland consisted of two Moray House Intelligence Tests, two English tests and an Arithmetic Test. Admission to grammar schools was made on the combined total score in the attainment tests, the higher I.Q. being used by most Education Authorities to decide the fate of "borderline" candidates.
2. Approximately 50 per cent of the eligible pupils sat the Qualifying Examination. They were entered for the examination on the advice of teachers or at the request of their parents.
3. The findings in this part of the investigation were based on the scores of a random sample of 1925 candidates.
4. The mean scores in the Q.E. tests show wide variations from one Education Authority to another, indicating that different standards of selection have been used.
5. In Arithmetic, the boys' mean score is significantly higher than the girls', but the girls show a decided superiority in the English 2 paper.
6. Candidates from urban schools have higher mean scores than those from rural schools. This is probably due to the use of different standards in selecting entrants for the examination.
7. The mean scores of county school candidates are significantly higher than those of voluntary school candidates.

APPENDIX A.

Qualifying Examination Papers, 1948.



MINISTRY OF EDUCATION FOR  
NORTHERN IRELAND

QUESTIONS SET AT THE  
QUALIFYING EXAMINATION FOR  
ADMISSION TO GRAMMAR  
SCHOOLS

HELD BY THE MINISTRY OF  
EDUCATION FOR NORTHERN  
IRELAND

IN

April, 1948

BELFAST: HER MAJESTY'S STATIONERY OFFICE

1954

# ENGLISH LANGUAGE

Time allowed — 1½ hours

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*ALL questions should be answered.*

1. *Read carefully the following passage and then answer the questions (a) to (g) which follow it*

After eating our breakfast, we travelled across to the foot of the Portillo range. In the middle of summer cattle are brought up here to graze, but they had now all been removed; even the greater number of the guanacos had decamped, knowing well that if overtaken here by a snowstorm they would be caught in a trap. We had a fine view of a mass of mountains, the whole covered with unbroken snow, in the midst of which there was a blue expanse, no doubt a glacier,—a circumstance of rare occurrence in these mountains.

Now commenced a heavy and long climb. Bold conical hills of red granite rose on each hand; in the valleys there were several broad fields of perpetual snow. These frozen masses; during the process of thawing, had in some parts been converted into pinnacles, which as they were high and close together made it difficult for the cargo mules to pass. On one of these columns of ice, a frozen horse was sticking as on a pedestal, but with its hind legs straight up in the air. The animal, I suppose, must have fallen with its head downward into a hole, when the snow was continuous, and afterwards the surrounding parts must have been removed by the thaw.

When nearly on the crest of the Portillo, we were enveloped in a falling cloud of minute particles of ice. This was very unfortunate, as it continued the whole day and quite intercepted our view.

(a) Give FOUR reasons why you think the journey described was not in the British Isles.

(b) There are three main colours in the landscape. What are they, and with what is each connected?

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- (c) The journey was made in autumn. What two statements show us this?
- (d) Write out the phrase which tells you that glaciers are not common in these mountains.
- (e) What would lead you to think that the climbers reached a great height above sea-level?
- (f) How were the provisions of the party carried?
- (g) At what time of the year did the horse meet with his accident?
2. (a) Write out the words in the passage given in Question 1 which have the same meaning as the following:—
- (i) a river of ice.
  - (ii) departed.
  - (iii) the highest part.
  - (iv) changed.
  - (v) wrapped round.
- (b) Give briefly the meaning of the phrases underlined in the passage.
3. (a) In the passage in Question 1, the sentence beginning "The animal" and ending "removed by the thaw", contains examples of seven parts of speech. Write out one example from this sentence of each, naming the part of speech.
- (b) Analyse the sentence "Now commenced a heavy and long climb".
4. Change the following passage into direct speech,—that is, write, wherever possible, the words which were actually spoken, and insert inverted commas (quotation marks). Insert any other necessary punctuation marks.

When the doctor asked Mary how old she was, she replied that she would be fifteen in March. The doctor remarked that she was not very tall for her age, to which Mary cheerfully replied that everybody said so. She set down the milk and the bread on the table, and asked whether the

APPENDIX A.

Qualifying Examination Papers, 1948.

MINISTRY OF EDUCATION FOR  
NORTHERN IRELAND

QUESTIONS SET AT THE  
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# ENGLISH LANGUAGE

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1. *Read carefully the following passage and then answer the questions (a) to (g) which follow it*

After eating our breakfast, we travelled across to the foot of the Portillo range. In the middle of summer cattle are brought up here to graze, but they had now all been removed; even the greater number of the guanacos had decamped, knowing well that if overtaken here by a snowstorm they would be caught in a trap. We had a fine view of a mass of mountains, the whole covered with unbroken snow, in the midst of which there was a blue expanse, no doubt a glacier,—a circumstance of rare occurrence in these mountains.

Now commenced a heavy and long climb. Bold conical hills of red granite rose on each hand; in the valleys there were several broad fields of perpetual snow. These frozen masses; during the process of thawing, had in some parts been converted into pinnacles, which as they were high and close together made it difficult for the cargo mules to pass. On one of these columns of ice, a frozen horse was sticking as on a pedestal, but with its hind legs straight up in the air. The animal, I suppose, must have fallen with its head downward into a hole, when the snow was continuous, and afterwards the surrounding parts must have been removed by the thaw.

When nearly on the crest of the Portillo, we were enveloped in a falling cloud of minute particles of ice. This was very unfortunate, as it continued the whole day and quite intercepted our view.

- (a) Give FOUR reasons why you think the journey described was not in the British Isles.
- (b) There are three main colours in the landscape. What are they, and with what is each connected?

[OVER

- (c) The journey was made in autumn. What two statements show us this?
- (d) Write out the phrase which tells you that glaciers are not common in these mountains.
- (e) What would lead you to think that the climbers reached a great height above sea-level?
- (f) How were the provisions of the party carried?
- (g) At what time of the year did the horse meet with his accident?

2. (a) Write out the words in the passage given in Question 1 which have the same meaning as the following:—

- (i) a river of ice.
- (ii) departed.
- (iii) the highest part.
- (iv) changed.
- (v) wrapped round.

(b) Give briefly the meaning of the phrases underlined in the passage.

3. (a) In the passage in Question 1, the sentence beginning "The animal" and ending "removed by the thaw", contains examples of seven parts of speech. Write out one example from this sentence of each, naming the part of speech.

(b) Analyse the sentence "Now commenced a heavy and long climb".

4. Change the following passage into direct speech,—that is, write, wherever possible, the words which were actually spoken, and insert inverted commas (quotation marks). Insert any other necessary punctuation marks.

When the doctor asked Mary how old she was, she replied that she would be fifteen in March. The doctor remarked that she was not very tall for her age, to which Mary cheerfully replied that everybody said so. She set down the milk and the bread on the table, and asked whether the

doctor required anything else. He answered that he did not, and enquired whether it was not time for her to go to bed.

5. Write in full the incomplete words in the following passage. Do not write out the whole passage.

Mrs. Brown went shopping the other day. At the grocer's, besides her ration of marg—, she was able to buy a pound of bis—s, and a jar of grapefruit marm—. She also bought some homegrown tom— and some r—b. Then she went to the chemist's, where she w—d the baby on the scales, and bought some med— for Mr. Brown's cough. By the time she reached home her heavy par—ls were begin—g to emb—s her.

---

## ENGLISH COMPOSITION

Time allowed — 1 hour

---

*Write a composition on ONE of the following:—*

1. A description of a public park on a summer evening.
2. A description of an attractive country cottage.
3. The story of Cinderella, as told by one of the Ugly Sisters.
4. Imagine that a year ago you were shipwrecked on an island inhabited by simple but friendly black people who made you their leader. Write a letter to a friend at home telling what happened during the year—your adventures, the new friends you made, what you taught the inhabitants, and what you learned from them.
5. A conversation between two women about a new family which has recently come to live in their district. Imagine that there are four new-comers, father, mother, and two children, and that one of the speakers has reason to dislike them while the other is friendly towards them.

[OVER

6. While boarding a bus a lady dropped her purse, but before she could pick it up a dog snatched it and ran off. After an exciting chase the dog was persuaded to surrender the purse in exchange for a bone supplied by a butcher.

Expand this into an interesting story.

## ARITHMETIC

Time allowed— $1\frac{1}{2}$  hours

- Find the cost of 100 stamps at  $2\frac{1}{2}$ d. each.
- How many packets each holding 2 ounces can be filled from 1 cwt. of tobacco?
- In March a housewife bought 3 pints of milk each day at 9d. per quart. What was her milk bill for the month?
- A bottle when empty weighs 1 lb. 13 oz. When filled with liquid it weighs 7 lb. 9 oz. What would it weigh when half-full of liquid?
- Look at (a) below\*.  $\frac{1}{4}$  is less than  $\frac{1}{3}$  so the word "less" has a line under it. Draw a line under the correct word (greater, equal or less) for (b), (c), (d), (e), (f).
  - $\frac{1}{4}$  is greater than, equal to, less than  $\frac{1}{3}$ .
  - 0.45 is greater than, equal to, less than  $\frac{2}{5}$ .
  - 5.632 is greater than, equal to, less than  $17.6 \times 3.2$ .
  - 1.73 is greater than, equal to, less than  $1.245 \div 0.065$ .
  - $1\frac{1}{2}$  is greater than, equal to, less than  $\frac{1}{2} + \frac{1}{3} + \frac{1}{4}$ .
  - $\frac{1}{3}$  is greater than, equal to, less than half the sum of  $\frac{1}{2}$  and  $\frac{1}{4}$ .
- Draw a line under the correct word (greater, equal or less) for (a), (b), (c), (d), (e) below.\*
  - 5% is greater than, equal to, less than  $\frac{1}{3}$ .
  - $\frac{1}{3}$  is greater than, equal to, less than  $6\% + 6\frac{1}{2}\%$ .

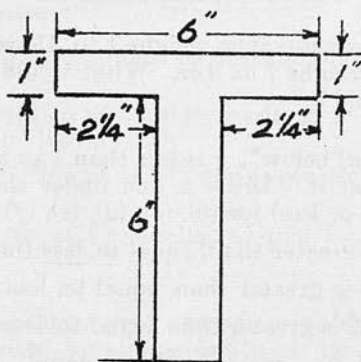
- (c)  $0.375$  is greater than, equal to, less than  $37\frac{1}{2}\%$ .  
 (d)  $6\%$  of  $7$  is greater than, equal to, less than  $7\%$  of  $6$ .  
 (e)  $17\frac{3}{4}$  is greater than, equal to, less than  $5\%$  of  $17\frac{3}{4}$  plus  $95\%$  of  $17\frac{3}{4}$ .

7. The total fare for a party of 4 children and 6 men on a certain journey is £1 5s. 4d. If the fare for a child is half that for a man find the total fare for a party of 6 children and 7 men on the same journey.

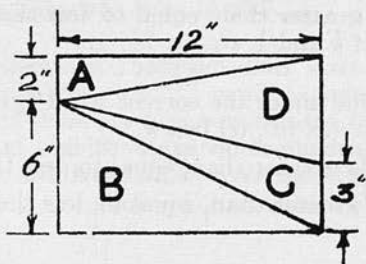
8. On a certain day a tram-conductor took £2 17s. 4d. in penny fares and £2 8s. 6d. in twopenny fares. How much more money would he have taken if he had charged  $1\frac{1}{2}$ d. for the penny fares and  $2\frac{1}{2}$ d. for the twopenny fares?

9. A dealer bought 5 tons of patent fertiliser at £23 7s. 6d. per ton. He sold a quarter of it in bags holding  $\frac{1}{4}$  stone each at 1s. 3d. per bag, and the remainder in bags holding  $\frac{1}{2}$  stone each at 2s. 5d. per bag. How much did he gain?

10. Find the area in square inches of the figure shown below.



11. Find the area in square inches of each of the triangles A, B, C and D in the rectangle below.



[OVER



12. A rectangular plot of building ground measuring 80 yards by 19 yards was sold for £427 10s. Find the price per square foot.

13. A certain machine makes 125 cigarettes per minute. If it is in operation from 8-17 a.m. to 12-28 p.m. and from 1-32 p.m. to 5-58 p.m. how many cigarettes will it make?

14. Choose one fraction from the list (a), one from the list (b) and one from the list (c) so that the sum of the three fractions chosen will be 0.527. Draw a line under the fraction chosen in each list.

$$(a) \frac{4}{7}, \frac{1}{4}.$$

$$(b) \frac{1}{3}, \frac{1}{4}, \frac{1}{10}, \frac{1}{50}.$$

$$(c) \frac{1}{7}, \frac{1}{9}, \frac{57}{1000}, \frac{27}{1000}, \frac{7}{1000}.$$

15. Beginning at a corner a man placed posts at equal intervals of  $5\frac{1}{2}$  yards right round a rectangular field measuring 88 yards by 66 yards. How many posts did he need?

16. A woman bought  $7\frac{1}{2}$  yards of cloth. In being washed it shrank by  $\frac{1}{10}$  of its length. What length should she have bought if she had wished to have  $7\frac{1}{2}$  yards after washing?

17. A boy arranged his toy soldiers in rows of 12 and had 5 over. If he had arranged them in rows of 9 how many might he have had left over?

*Note.*—There are three answers. Give them all.

18. 526 children attended a school treat. Each child was given either 2 oranges, or 2 apples, or 1 orange and 1 apple. Altogether 345 oranges were needed and 91 children got 2 oranges each. How many apples were needed altogether?

19. A chain is made of metal  $\frac{3}{16}$ " thick. It has 24 links and the distance from tip to tip of each link is  $2\frac{5}{8}$ ". Find, in inches, the total length of the chain.

20. Six men have permanent places on a tug-of-war team: the two remaining men on the team are chosen from four men X, Y, Z and W. Using the table given below\* find how much heavier Y is than X.

When team includes	X and Y	X and Z	Z and W	X and W
Total weight is	104 stone	103 stone 7 lb.	104 stone 2 lb.	104 stone 7 lb.

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\*Note: The question paper used at the examination in Arithmetic was in the form of a combined question paper and answer book. The answers were written in the spaces provided opposite the questions.

APPENDIX B.

Qualifying Examination Papers, 1954.

MINISTRY OF EDUCATION FOR  
NORTHERN IRELAND

QUESTIONS SET AT THE  
QUALIFYING EXAMINATION FOR  
ADMISSION TO GRAMMAR  
SCHOOLS

HELD BY THE MINISTRY OF  
EDUCATION FOR NORTHERN  
IRELAND

IN

March, 1954

BELFAST: HER MAJESTY'S STATIONERY OFFICE  
1954

# ENGLISH

(FIRST PAPER)

Time allowed — 1 hour

---

*ALL the questions should be answered.*

1. Read carefully the following passage, and then answer the questions (a) to (j) that follow it.

As the sun sank low in the sky, he crept from the cover of the wood, peered cautiously about him, and then, reassured, set out across the fields towards the village he had seen, hoping to find there a temporary **refuge**. The unaccustomed heaviness of his shoes weighed down his feet, and his coarse, ill-fitting clothes **chafed** his body, but, **putting forth his utmost effort**, he quickly covered the ground.

Suddenly, from the wood behind him, the rooks rose in a black cloud, filling the air with harsh cries. Nor did they settle again **as was their wont**, but circled in **agitated** fashion above the trees. The man gave a startled glance and hesitated. He looked around him, and then, with sudden resolution, made swiftly to a hillock near by. On it grew a sturdy oak whose **foliage**, though brown, was still thick enough to afford **concealment**. He sprang, swung himself on to a low branch and, clambering upwards, was soon high above the ground, anxiously studying the wood.

It was as he feared. Almost at once he could see the gleam of breastplate and helmet as from the thicket **emerged** a body of troopers, half hidden in the dust raised by their horses' hooves. Coming into the open, they halted. At the **curt** orders of the leader two of them spurred their horses up the hillock and, from under the oak, gazed in every direction.

"You won't have to climb the tree after all," said one, glancing at the rustling canopy of leaves above him. "We can see right to the village and he isn't in sight."

- (a) How do you know that the incident did not take place till late in the day?
- (b) What suggests that it had not rained that day?
- (c) In what season of the year did the incident take place? How can you tell from the passage?
- (d) How can you tell that it did not happen recently?



- (e) From the information given in the passage state which of the following words best describes the man who hid in the tree. (tramp, fugitive, traveller, pursuer).
- (f) What word in the passage suggests that he did not intend to stay in the village a long time?
- (g) Give two reasons for thinking he was anxious not to be seen.
- (h) Why did the rooks in the wood rise crying?
- (i) You are not told the orders the leader gave to the two troopers, but you can guess from the information contained in the passage. What do you think he may have said to them?
- (j) Give the meaning of the words and phrases printed in heavy type as they are used in the passage.  
refuge, chafed, putting forth his utmost effort, as was their wont, agitated, foliage, concealment, emerged, curt.

2. Write in full the incomplete words in the following letter. Do NOT write out the letter:

3, Hilltop Road,  
Portstewart.  
28th July, 1953.

Dear Aunt Margaret,

I hope you rec——ed the postcard I sent you last We——day.

We are having a pl——ant holiday and the p——ple in the house are very fr——dly. We have a magnif——nt view of the sea from our bedroom. So far the w——ther has been on its best behav——r. Although the sky has been oc——ionally overcast, the sun has been shi——ing most of the time and Mother has not found it necessary to use her umb——la.

My c——sin Joan and I go to the be——ch every morning to bathe and go c——cling in the afternoons. We have had only one pun——re as yet. Yesterday we trav——ed along the coast road and picn——ed by a bea——ful little bay.

Do please write as soon as you have an op——ity.

Your loving n——ce,  
Mary.

[OVER

3. Rewrite the following passage inserting all necessary punctuation and quotation marks:—

whats that youre reading asked mother its a book called gullivers travels that I borrowed from the childrens library tom answered our teacher told us that its author jonathan swift was an irishman who once lived in county antrim

4. (a) The following headlines appeared in a local newspaper. Without using either "and" or "but" write down one well constructed sentence containing all the facts given.

Local School Sports.

Brilliant Sunshine at Hillview Park.

Big Crowds Present.

Jack Sprat Breaks School High Jump Record.

(b) Construct sentences (one for each word) to show that you can use the following correctly:—

except, seen, past, blew, swum.

---

## ENGLISH

(SECOND PAPER)

Time allowed —  $1\frac{1}{4}$  hours*ALL the questions should be answered.**You are advised to spend not more than 20 minutes on Question 1, and not more than 20 minutes on Question 2.*

1. Peter wrote this letter to his cousin Richard, who lives at 356, Redcastle Avenue, Belfast. Write Richard's reply.

Hillchester Farm,  
Omagh,  
Co. Tyrone.  
4th March, 1954.

Dear Richard,

Here is good news. We are all going to Belfast on Easter Monday, for father is giving us a special treat. Will you meet us at the Great Northern Station at 10 o'clock?

We intend to visit the Zoo and wish to know if you will come with us. Afterwards, we plan to call at your house to see your father and mother. Do you think they will be at home about 5 o'clock?

Mother would like you to come back with us and spend part of your holiday here on our farm. Will you do this and stay as long as you can? We shall be delighted if you will. Tell me some of the things you would like to do during your stay and I will make preparations.

Your loving cousin,  
Peter.

2. Do ONE of the following:

- (a) Name your favourite indoor game and tell how you play it.
- (b) Describe a place where you have had a picnic.
- (c) Tell how to decorate a classroom for Christmas.
- (d) Describe a breadvan that visits your district.

3. Write out a story suggested by the following passage. You need not write out the passage.

No one. No one anywhere so far. Dead silence in the kitchen; in the hall the slow beat of the clock was all I heard. Where were they? What was happening?

[OVER]

## ARITHMETIC

Time allowed —  $1\frac{1}{2}$  hours

1. How much would a man earn if he worked 44 hours at 2s. 10d. per hour?

2. The yield of wheat from a 20-acre field was 1 ton 10 cwt. per acre. What was its total value at £29 15s. per ton?

3. How many gallons altogether would a milkman use to fill 24 half-pint bottles, 118 pint bottles and 11 quart bottles?

4. A, B, C, D, E and F are stations in this order on a railway line. The table below\* shows the number of miles each station is distant from A. Enter in the spaces marked ( ) the answers to the questions given below the table.

Station	B	C	D	E	F
Number of miles distant from A	39	88	136	188	217

(i) What is the fare from A to F at 2d. per mile? Ans. ( )

(ii) How many miles is it from C to F? Ans. ( )

(iii) What is the distance between the two neighbouring stations which are furthest apart from each other? Ans. ( )

(iv) What is the distance between the two stations which are closest together? Ans. ( )

5. The total cost of 20 pieces of iron bar, each  $5\frac{1}{4}$  feet long, is £1 15s. What is the cost of 1 foot of the bar?

6. Look at the incomplete statements below\*. Enter in the spaces marked ( ) the numbers needed to complete these statements correctly.

$$0.1 \times 0.1 = ( )$$

$$0.1 \div 0.1 = ( )$$

$$0.01 \div 0.001 = ( )$$

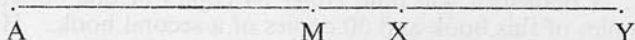
$$0.01 \div 0.1 = ( )$$

7. A Verst is a measure of distance used in Russia. 1 mile equals 1.508 Versts. How many miles are equal to 377 Versts?

8. A tractor ploughs 3 acres and uses 10 gallons of vaporising oil at 1s. 6d. a gallon,  $\frac{1}{2}$  pint of lubricating oil at 6s. a gallon, and a quart of petrol at 4s. 3d. a gallon. What would be the total cost of the oil and petrol used in ploughing 24 acres?

9. After a reduction of one penny in the shilling a bill amounted to £2 0s. 4d. What was the amount of the bill before the reduction?

10. Look at the line AY below\*. M is the middle point. If AX is  $11\frac{1}{4}$  inches long and MX is  $3\frac{1}{3}$  inches long, calculate the length of XY.



11. Look at the statements below\*. The first line shows that the cost of 1,536 articles at 3s.  $8\frac{1}{2}$ d. each is £284 16s. 0d.

Using this information find the answers to the remaining questions and enter them in the places marked ( ).

The cost of 1,536 articles at 3s.  $8\frac{1}{2}$ d. each = £284 16s. 0d.

The cost of 1,535 articles at 3s.  $8\frac{1}{2}$ d. each = ( )

The cost of 1,536 articles at 7s. 5d. each = ( )

The cost of 512 articles at 3s.  $8\frac{1}{2}$ d. each = ( )

The cost of 2,048 articles at 3s.  $8\frac{1}{2}$ d. each = ( )

12. At 9 a.m. on Wednesday a clock shows 9.13. If the clock gains 20 seconds every hour when did it last show the correct time?

13. Below\* is shown the time-table of two buses on the same route. The second bus takes the same time between stops as the first. Enter in the spaces marked ( ) the times needed to complete the table correctly.

Stops	First Bus	Second Bus
A	8.15 a.m.	( )
B	( )	12.2 p.m.
C	8.28 a.m.	( )
D	8.32 a.m.	12.11 p.m.
E	8.39 a.m.	( )

[OVER



14. A bundle of cotton weighs 10 lb. and 20 hanks of cotton weigh 1 lb. 120 yards of cotton are a skein and 7 skeins are a hank.

How many yards of cotton are in a bundle?

15. A bucket which holds 18 lb. of coal was filled each day from a store. Before the bucket was filled on 19th October the store held 1 ton 56 lb. What weight, in cwt., was left in it after the bucket was filled on 20th December?

16.  $\frac{1}{3}$  of the balls in a box are white,  $\frac{1}{4}$  black,  $\frac{1}{5}$  blue and the rest yellow. Find 3 of the possible answers for the number of balls in the box.

17. A bookshelf will hold *either* 84 copies of one book, *or* 48 copies of this book and 30 copies of a second book. How many copies of the second book would it hold?

18. Two liquorice sticks, one twice as long as the other, are to be shared equally among four boys. The shorter stick is to be cut once and the longer twice.

Look at the statements below\* and enter in the places marked ( ) the fractions needed to complete these statements correctly.

One boy got ( ) of the shorter stick.

Two boys each got ( ) of the longer stick.

The fourth boy got ( ) of the shorter stick and ( ) of the longer stick.

19. When a tank was sound it could be filled by a tap in 40 minutes, but after the tank developed a leak  $\frac{1}{4}$  way up one side, it took the tap 46 minutes to fill it. How long did it take the tap to make the tank  $\frac{3}{4}$  full after the leak developed?

\*Note: The question paper used at the examination in Arithmetic was in the form of a combined question paper and answer book. The answers were written in the spaces provided opposite the questions.

APPENDIX C.

Junior Certificate Examination Papers, 1951.

MINISTRY OF EDUCATION FOR  
NORTHERN IRELAND

EXAMINATION PAPERS ISSUED  
AT THE GRAMMAR SCHOOL  
CERTIFICATE EXAMINATIONS,  
1951

VOL. I—JUNIOR CERTIFICATE

BELFAST: HER MAJESTY'S STATIONERY OFFICE

1954

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MINISTRY OF EDUCATION FOR  
NORTHERN IRELAND

GRAMMAR SCHOOL CERTIFICATE  
EXAMINATIONS, 1951

JUNIOR

ENGLISH

(FIRST PAPER)

COMPOSITION AND GRAMMAR

Time allowed—2½ hours.

---



1. Write a composition on ONE of the following subjects :—

N.B.—It is not necessary to write a long composition : marks will be awarded for quality rather than quantity.

- (a) My diary.
- (b) A festival or celebration in town OR country.
- (c) Describe your adventures as a Pirate King (OR Queen).
- (d) The use and abuse of leisure.
- (e) Boys' OR girls' papers.
- (f) A summer storm.

(100 marks)

2. (a) Make a general grammatical analysis of the following sentence :—

When she was satisfied on all these points, he took the opportunity, while their two fathers were talking to each other, of introducing his mother-in-law and speaking of her with so much gratitude for the happiness she had brought to his father, that she began to understand more than ever why he wished to please her.

(b) Rewrite, with correct capitals and punctuation :—  
Peter my boy I said why did you do that was it because you liked it

(c) Write the past participle of the following verbs :—eat, forget, do, loose.

(d) By adding a prefix, form a word of opposite meaning to FOUR of the following words (for example : *fair—unfair*) :—

appear, responsible, legal, pious, sense.

(50 marks)

MINISTRY OF EDUCATION FOR  
NORTHERN IRELAND

GRAMMAR SCHOOL CERTIFICATE  
EXAMINATIONS, 1951

JUNIOR

ENGLISH

(SECOND PAPER)

LANGUAGE AND LITERATURE

Time allowed— $2\frac{1}{2}$  hours

---

*ALL questions should be answered.*

## SECTION A

### LANGUAGE

1. Read the following passage carefully and answer concisely the questions below :—

Soon after his escape Baldassarre had chanced to meet a stranger who wore Tito's ring, and though he would have been unable to describe the ring beforehand, the sight of it stirred sleeping memories, and he recognised it. That Tito, nearly a year after his father had been separated from him, should have been living in prosperity at Florence, selling the ring he ought not to have sold till the last extremity, was a fact by which Baldassarre was at first stunned and bewildered. And then he said, " I shall have my revenge ".

He bought a bright dagger at Bratti's. Paying his meditated visit there one evening at dusk, he found that singular rag-merchant just returned from one of his rounds, emptying out his basketful of broken glass and old iron amongst his handsome show of second-hand goods. By buying the dagger Baldassarre could not only satisfy a strong desire, he could also open his original errand in a more indirect manner than by speaking of the ring. In the course of bargaining for the weapon, he let drop, with cautious carelessness, that he came from Genoa, and had been directed to Bratti's shop by an acquaintance in the city who had bought a very valuable ring there. Had the respectable trader any more such rings ?

Whereupon Bratti had much to say as to the unlikelihood of such rings being within the reach of many people, with much boasting of his great connexions, due to his known wisdom and honesty. It might be true that he was a pedlar—he chose to be a pedlar ; though he was rich enough to kick his heels in his shop all day. How was it that he could put that ring in a stranger's way ? It was, because he had a very particular knowledge of a handsome young noble, who did not look quite so fine a feathered bird when Bratti first set eyes on him as he did at the present time. And by a question or two Baldassarre extracted, without any trouble, such a rough and rambling account of Tito's life as the pedlar could give since the time he had met him. It never occurred to Bratti that the decent man (who was rather deaf, apparently, asking him to say many things twice over) had any curiosity about Tito ; the curiosity was doubtless about himself, as a truly remarkable pedlar.

And Baldassarre left Bratti's shop, not only with the dagger at his side, but with a general knowledge of Tito's conduct and position—of his early sale of the ring, his immediate quiet settlement of himself at Florence, his marriage, and his great prosperity.

What story had he told about his previous life—about his father?

(i) Tell, in order of time, as *fully* as you can, the story of Baldassarre and his son Tito. Bring out the kind of man Tito was, his way of life in Florence, and Baldassarre's reasons for seeking revenge, and what success he met with in his inquiries.

(ii) *In your own words*, write a paragraph describing Bratti, as *fully as possible*.

(iii) Using not more than 40 words, rewrite the third paragraph of the passage ("Whereupon . . . pedlar").

(iv) Explain *in your own words* the meaning of the five phrases underlined.

(50 marks)

## SECTION B

### PRESCRIBED LITERATURE FOR INTENSIVE STUDY

2. Answer (a) OR (b) OR (c). In each case show your acquaintance with the text of the play by using suitable quotations :—

- (a) Describe three incidents in *Julius Caesar* that create suspense by suggesting that the murder of Caesar will not take place.

OR

- (b) Give a short account, in your own words, of the funeral speech delivered by Antony, mentioning the various means by which he influenced the crowd.

OR

- (c) Describe the quarrel between Brutus and Cassius before the battle of Philippi, and how it was made up and ended.

(50 marks)

[OVER

3. Answer EITHER (a) OR (b).

(a) From "Fact and Fiction," name an extract which deals with each of the following :—North Africa, the Scottish Highlands, South America, Germany, the Continent of Europe. Choose ONE of these extracts that you consider exciting or humorous, give some account of its subject-matter, and show what makes it exciting or humorous.

OR

(b) From "Junior Modern Essays," give the names of two extracts dealing with pirates, and of two dealing with travel. Name the authors of these four extracts. Choose one of these pairs of essays, give a short account of their subject-matter, and show how they are alike or different.

(50 marks)

### SECTION C

#### PRESCRIBED LITERATURE FOR LESS INTENSIVE STUDY

4. Answer EITHER (a) OR (b).

(a) Name the authors of the following :—The Forsaken Merman, The Rime of the Ancient Mariner, The Lady of Shalott, The Listeners, The Lighthouse. Choose ONE of these poems, give a short account of its subject-matter, and remark on the poet's treatment of the supernatural.

OR

(b) Name four poems from "The Ambleside Book of Verse" that deal with flowers, OR four that deal with life in the open air. Name the authors of the group you have chosen, give a short account of what they have to say, and compare their points of view.

(50 marks)

5. Describe the kind of country (or town) and people you meet in ONE of the books set for reading this session (*Lorna Doone*, *David Copperfield*, *The Vicar of Wakefield*, *The Talisman*, *Kidnapped*, *Travels with a Donkey*).

(50 marks)



# MINISTRY OF EDUCATION FOR NORTHERN IRELAND

## GRAMMAR SCHOOL CERTIFICATE EXAMINATIONS, 1951

### JUNIOR

### GREEK

Time allowed—2½ hours

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*Sections A and B are alternatives. Candidates must not attempt both.*

*ALL the other questions should be answered.*

#### COMPOSITION

1. *Translate into Greek :—*

- (a) The generals who saved their country were honoured by the citizens.
- (b) Our sailors after defeating the enemy pursued them into the harbour.
- (c) I know not only where I am going but also who is going with me.
- (d) When will you learn that the best orators speak most clearly ?
- (e) Whenever rulers are wise, they try to establish good laws.

(80 marks)

# PRESCRIBED BOOK

*Sections A and B are alternatives. Candidates must not attempt both.*

## SECTION A

*Fact and Legend from the Father of History*, edited by PHILLPOTTS and ARMSTRONG (Rivingtons), Part V (The Invasion of Greece by Xerxes).

### 2. *Translate into English :—*

ἦκοντα δὲ τοῦτον ἤρετο ὁ Ξέρξης “διὰ τί τοιαῦτα ποιοῦσιν οἱ Λακεδαιμόνιοι;” ὁ δὲ ἀπεκρίνατο τάδε· “οἱ ἄνδρες, ὦ βασιλεῦ, πάρεσι μαχοῦμενοι ἡμῖν περὶ τῆς εἰσόδου, καὶ εἰς τοῦτο δὴ παρασκευάζονται. νόμος γὰρ αὐτοῖς ἐστίν, ὅταν μέλλωσιν ἐς κίνδυνον ἵεναι, τότε τὰς κεφαλὰς κοσμεῖσθαι. εὖ δὲ ἴσθι, ἦν τούτους τε καὶ τοὺς ἐν τῇ Σπάρτῃ ὑπομένοντας νικήσης, οὐδὲν ἄλλο ἐστὶν ἔθνος ὃ σοι ἀντιστήσεται.”

(25 marks)

### 3. *Translate into English :—*

τοῦτον τὸν λόγον τῷ βασιλεῖ προσέφερεν· “ὦ δέσποτα, μὴ μεγάλως σε λυπεῖτω τὸ γεγόνός· οὐ γὰρ ξύλων ἐστὶν ὁ ἄγων, ἀλλ’ ἀνδρῶν τε καὶ ἵππων. εἰ μὲν οὖν δοκεῖ, αὐτίκα πειρώμεθα τῆς Πελοποννήσου· εἰ δὲ βεβούλευσαι αὐτὸς ἀπελάνειν, μὴ, ὦ βασιλεῦ, Πέρσας γε καταγελάστους ποιήσης· ἡμεῖς γὰρ ἄνδρες ἀγαθοὶ γεγενήμεθα· Φοίνικες δὲ καὶ Αἰγύπτιοι καὶ οἱ ἄλλοι εἰ κακοὶ ἐγένοντο, οὐκ ἐσμέν τούτου μεταίτιοι. ὥστε εἰ δοκεῖ σοι οἴκαδε ἀπιέναι, ἐμὲ χρή σοι τὴν Ἑλλάδα παρασχεῖν δεδουλωμένην.”

(25 marks)

### 4. *Either :—*

(a) Give your impression of the character of Xerxes.

*Or :—*

(b) Comment on the statement: “Themistocles as a leader was clever, but quite unscrupulous.”

(10 marks)

*Sections A and B are alternatives. Candidates must not attempt both.*

### SECTION B

Xenophon, *Anabasis*, Book I, Chapters VI to VIII.

5. *Translate into English :—*

ὅπως δὲ καὶ εἰδῆτε εἰς οἷον ἔρχεσθε ἀγῶνα, ἐγὼ ὑμᾶς εἰδῶς διδάξω· τὸ μὲν γὰρ πλῆθος πολὺ καὶ κραυγῇ πολλῇ ἐπιάσιν· ἂν δὲ ταῦτα ἀνάσχησθε, τᾶλλα καὶ αἰσχύनेσθαι μοι δοκῶ οἷους ἡμῖν γνώσεσθε τοὺς ἐν τῇ χώρᾳ ὄντας ἀνθρώπους. ὑμῶν δὲ ἀνδρῶν ὄντων καὶ εὖ τῶν ἐμῶν γενομένων ἐγὼ ὑμῶν τὸν μὲν οἵκαδε βουλόμενον ἀπίεναι τοῖς οἴκοι ζηλωτὸν ποιήσω ἀπελθεῖν, πολλοὺς δὲ οἶμαι ποιήσιν τὰ παρ' ἐμοὶ ἐλέσθαι ἀντὶ τῶν οἴκοι.

(25 marks)

6. *Translate into English :—*

Κῦρος δ' ὁρῶν τοὺς Ἑλλήνας νικῶντας τὸ καθ' αὐτοὺς καὶ διώκοντας, ἡδόμενος καὶ προσκυνούμενος ἤδη ὡς βασιλεὺς ὑπὸ τῶν ἀμφ' αὐτόν, οὐδ' ὡς ἐξήχθη διώκειν, ἀλλὰ συνεσπειραμένην ἔχων τὴν τῶν σὺν ἑαυτῷ ἐξακοσίων ἱππέων τάξιν ἐπεμελεῖτο ὅ,τι ποιήσει βασιλεὺς. καὶ γὰρ ἤδει αὐτόν ὅτι μέσον ἔχοι τοῦ Περσικοῦ στρατεύματος. καὶ πάντες δ' οἱ τῶν βαρβάρων ἄρχοντες μέσον ἔχοντες τὸ αὐτῶν ἡγοῦνται, νομίζοντες οὕτως ἐν ἀσφαλεστάτῳ εἶναι.

(25 marks)

7. *Either :—*

(a) Tell briefly the story of the fate of Orontas.

*Or :—*

(b) Explain the part played by Clearchus in the battle of Cunaxa.

(10 marks)

## UNPRESCRIBED TRANSLATION

8. *Translate into English :—*

(a) τί βούλεσθε ποιεῖν ; ἄρ' οὐχ ἡμῖν ἀποκρινεῖσθε ;

(b) οἱ τὴν πατρίδα προδόντες ἄξιοί εἰσι τῆς μεγίστης ζημίας.

(c) οὔτε ἀκήκοας οὔτε ἑώρακας οὐδὲν τούτου κάκιον.

(d) δεῖ ῥήτορα μεγάλην ἔχειν τὴν φωνὴν καὶ μὴ φοβεῖσθαι τοὺς παρόντας.

(e) πλεῖστοι φύλακες εἰστήκεσαν πρὸς ταῖς πύλαις κωλύσοντες τοὺς ξένους εἰσιέναι. (50 marks)

9. *Translate into English :—*

*The Greek soldiers of the Anabasis meet friends on the homeward march.*

Ἐντεῦθεν ἀφικνουῦνται εἰς Τιβαρηνούς, καὶ μετὰ ταῦτα πορευόμενοι δύο ἡμέρας ἀφίκοντο εἰς πόλιν Ἑλληνίδα, ἐνταῦθα δὲ ἔθυσαν τοῖς θεοῖς, καὶ ἐποίησαν ἀγῶνας γυμνικούς· ἐν τούτῳ ἔρχονται ἐκ Σινώπης πρέσβεις, προηγόρει δὲ αὐτῶν Ἑκατόνυμος, δεινὸς ὦν λέγειν· οὗτοι δὲ εἶπον ὅτι οὐχ ἥκοιεν ποιησόμενοι πόλεμον, ἀλλ' ἐπιδείζοντες ὅτι φίλοι εἶεν· οἱ δὲ Ἕλληνες ἐπυνθάνοντο αὐτῶν περὶ τῆς λοιπῆς πορείας, εἰ κατὰ γῆν ἢ κατὰ θάλατταν δέοι πορεύεσθαι.

[προηγόρεω, speak on behalf of]

(50 marks)

10. *Translate into English :—*

*Astyages allows the youthful Cyrus to go to the rescue with him.*

Ἐπεὶ δὲ ἤκουσεν ὁ Ἀστυάγης ὅτι πολέμιοί εἰσιν ἐν τῇ χώρᾳ, ἐξεβοήθει καὶ αὐτὸς καὶ τοῖς ἄλλοις ἐσήμεναι πᾶσιν ἐκβοηθεῖν. ὥς δὲ εἶδον πολλοὺς ἀνθρώπους τῶν Ἀσσυρίων συντεταγμένους καὶ τοὺς ἱππέας ἡσυχίαν ἔχοντας, ἔστησαν καὶ οἱ Μῆδοι. ὁ δὲ Κῦρος ὁρῶν ἐκβοηθοῦντας καὶ τοὺς ἄλλους, ἐκβοηθεῖ καὶ αὐτὸς πρῶτον τότε ὅπλα ἐνδύς, καὶ ὁ Ἀστυάγης ἐθαύμασε μὲν τίνος κελεύσαντος ἦκοι, ὅμως δὲ εἶπεν αὐτῷ μένειν παρ' ἑαυτῷ.

[ἐνδύω, put on]

(50 marks)

11. *Translate into English :—*

*Generous treatment of prisoners.*

ἐν δὲ τούτῳ προσάγουσι τῷ Κύρῳ τοὺς αἰχμαλώτους. ὥς δὲ εἶδεν, εὐθὺς λύειν μὲν ἐκέλευσε τοὺς δεδεμένους, τοὺς δὲ τετρωμένους ἰατροὺς καλέσας θεραπεύειν ἐκέλευσεν· ἔπειτα δὲ ἔλεξε τοῖς Χαλδαίοις ὅτι ἦκοι οὔτε ἀπολέσαι ἐπιθυμῶν ἐκείνους οὔτε πολεμεῖν δεόμενος, ἀλλ' εἰρήνην βουλόμενος ποιῆσαι. “ νῦν δὲ ὁρᾶτε δὴ ἐν οἴῳ ἐστέ· ἐγὼ οὖν ἀφίημι ὑμᾶς οἵκαδε τοὺς εἰλημμένους, καὶ δίδωμι ὑμῖν σὺν τοῖς ἄλλοις βουλεύσασθαι εἴτε βούλεσθε πολεμεῖν ἢ μὴν εἴτε φίλοι εἶναι.”

[θεραπεύω, cure]

(50 marks)

[OVER



## GREEK LIFE, CUSTOMS AND INSTITUTIONS

12. Write briefly on *any three* of the following :—

- (a) Illustrate from your reading the influence of the oracle of Delphi.
- (b) The use of the watchword and the paeon as preliminaries to a charge by Greek troops.
- (c) The origin and the distinctive features of a Greek city-state.
- (d) The Athenian coinage and monetary system.
- (e) The structure of Greek temples with special reference to the Parthenon. (60 marks)

MINISTRY OF EDUCATION FOR  
NORTHERN IRELAND

GRAMMAR SCHOOL CERTIFICATE  
EXAMINATIONS, 1951

JUNIOR

LATIN

Time allowed—2½ hours

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*ALL questions should be answered.*

COMPOSITION

1. Translate into Latin :—

- (a) Come here, boy, and show me the house.
- (b) Did Cicero not fight in Caesar's army?
- (c) When the messengers reached the river they saw that all the bridges were broken.
- (d) The storm was so great that no one dared to go out.
- (e) Having read the letter, he asked me why I had not brought the money with me.

(80 marks)

PRESCRIBED BOOK

CAESAR, *Civil War in Spain*, edited by GOULD and WHITELEY (Macmillan), chapters 41 to 60 inclusive.

2. Translate into English :—

Haec tum ratio nostros perturbavit insuetos huius generis pugnae ; circumiri enim sese ab aperto latere procurrentibus singulis arbitrabantur ; ipsi autem suos ordines servare neque ab signis discedere neque sine gravi causa eum locum quem ceperant dimitti censuerant oportere. Itaque perturbatis antesignanis legio quae in eo cornu constiterat locum non tenuit atque in proximum collem sese recepit.

(25 marks)

3. Translate into English :—

Qui inopinantes pabulatores et sine ullo dissipatos timore aggressi magnum numerum iumentorum atque hominum intercipiunt cohortibusque caetratis subsidio missis scienter in duas partes sese distribuunt, alii ut praedae praesidio sint, alii ut venientibus resistent atque eos propellant, unamque cohortem, quae temere ante ceteras extra aciem procurrerat, seclusam ab reliquis circumveniunt atque interficiunt.

(25 marks)

4. Relate *either* (a) how Caesar's position became critical after the battle for the hill near Ilerda ;

or (b) how the tide of fortune finally turned in Caesar's favour.

(10 marks)

UNPRESCRIBED TRANSLATION

5. Translate into English :—

(a) Pueri domum ante meridiem ire volebant.

(b) Me rogavit cur Galli frumentum ad castra ferre non possent.

(c) Multas res agricolae ad urbem ferunt quas vendant.

(d) Nuntios ad se noctu venire iussit ne inimici eos viderent.

(e) Milites tam diu in Hispania erant ut Romam redire nollent.

(50 marks)

## 6. Translate into English :—

*Caesar settles his troops after a campaign*

Hoc proelio trans Rhenum nuntiato Suebi, qui ad ripas Rheni venerant, domum reverti coeperunt; quos Ubii, qui proximi Rhenum incolunt, perterritos insecuti magnum ex eis numerum occiderunt. Caesar, una aestate duobus maximis bellis confectis, maturius quam anni tempus postulabat in hiberna in Sequanos exercitum duxit; hibernis Labienum praeposuit; ipse in Italiam profectus est.

[maturius, earlier.]

(50 marks)

## 7. Translate into English :—

*He rearranges his line for battle*

Simul his rebus cognitis quas demonstravimus, timens ne a multitudine equitum dextrum cornu circumveniretur, celeriter ex tertia acie singulas cohortes detraxit atque ex his quartam instituit equitatuque opposuit. Quid fieri vellet ostendit, monuitque eius diei victoriam in earum cohortium virtute constare. Simul tertiae aciei totique exercitui imperavit ne iniussu suo concurrerent; se cum id fieri vellet signum daturum.

[instituit, formed; iniussu suo, without orders from him.]

(50 marks)

## 8. Translate into English :—

*He acts quickly on information received*

Caesar, acceptis litteris hora circiter undecima diei, statim nuntium ad M. Crassum quaestorem mittit, cuius hiberna aberant ab eo milia passuum XXV; iubet media nocte legionem proficisci celeriterque ad se venire. Alterum ad C. Fabium legatum mittit, ut in Atrebatium fines legionem adducat, qua sibi iter faciendum sciebat. Scribit Labieno, si rei publicae commodo facere posset, cum legione ad fines Nerviorum veniat. Reliquam partem exercitus, quod paulo aberat longius, non putat expectandam.

(50 marks)

[OVER

## ROMAN LIFE, CUSTOMS AND INSTITUTIONS

9. Answer *any three* of the following :—

(a) Describe, very briefly, the battle for the hill between Ilerda and the enemy camp, making special reference to the effect of the enemy battle tactics on Caesar's soldiers.

(b) Give a list of school materials in use in ancient Rome, together with a description of books and their making.

(c) Write a note on the *toga*. What was the *toga praetexta*?

(d) Describe the trial of an accused person in a Roman court.

(60 marks)



# MINISTRY OF EDUCATION FOR NORTHERN IRELAND

## GRAMMAR SCHOOL CERTIFICATE EXAMINATIONS, 1951

### JUNIOR FRENCH

Time allowed—2½ hours

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*Sections 1, 2, 4 and 5 must be answered by all candidates ; candidates who answer the optional Section 3 (Phonetics) are required to answer only six of the twelve questions in Section 4 instead of ten.*

#### 1. GRAMMAR AND TRANSLATION INTO FRENCH

(a) Give the masculine singular form of the adjective corresponding to each of the following adverbs : fraîchement ; attentivement ; follement ; ardemment ; gentiment.

(b) Replace the nouns by pronouns, making any other changes necessary :

- (i) Le passant a donné une allumette aux fumeurs.
- (ii) Nous envoyons la carte à l'enfant.
- (iii) Le prêtre veut entendre votre voix à la chapelle.
- (iv) La maîtresse faisait travailler les servantes.
- (v) Ma mère avait acheté des poires.

(c) Replace the infinitive by the appropriate past tense. (*Do not translate*) :

Un professeur qui (enseigner) le latin (écrire) un soir dans son cabinet de travail quand il (croire) entendre des cris. Comme ceux-ci (devenir) toujours plus aigus, il (résoudre) d'en découvrir la cause. Il (jeter) un manteau sur ses épaules et (se diriger) vers la porte. Il (apercevoir) qu'il (pleuvoir) ; mais il ne (voir) rien que deux chats rôdeurs.

(d) Give the third person singular of the Future Simple tense of the ten verbs in brackets in passage (c).

(e) Make the past participles agree where necessary :

- (i) Se sont-ils (lavé) les mains ?
- (ii) La foi qu'il avait (abandonné).
- (iii) Elle est (allé) au marché.
- (iv) Vous vous êtes (trompé), mesdemoiselles.
- (v) Il a (donné) une poupée à sa fille.

(f) Insert suitable prepositions :

- (i) Il s'amuse — lire.
- (ii) Il s'est servi — mon crayon.
- (iii) Je pense souvent — mes amis.
- (iv) Il va demander de l'argent — son père.
- (v) Tournez-vous — moi.

(g) Translate into French :

- (i) The village has only one street, with about thirty houses.
- (ii) Is it still raining ? No, it is fine now.
- (iii) His friends are waiting for him ; they are near the church.
- (iv) How long have you been learning French ? Two years, Sir.
- (v) She went for milk, for there was none in the kitchen.
- (vi) I always enjoy myself in autumn because then I spend a month in the country with my cousins.

## 2. TRANSLATION INTO ENGLISH

Translate into English :

Maurice venait d'ouvrir les yeux le mercredi matin, lorsqu'il entendit un peu de bruit dans sa chambre. Il écouta quelques instants et crut qu'un rat était entré par quelque trou, et trottnait sous la table. Mais il vit son erreur, c'était un gros pigeon voyageur qui avait pénétré dans la chambre pendant la nuit. Maurice dormait, la fenêtre ouverte, naturellement. L'oiseau avait dû se poser sur le rebord de la fenêtre et entrer sans éveiller Maurice. Le jour était venu la pauvre bête cherchait à s'envoler, mais les barreaux de la fenêtre la gênaient. Aussitôt notre ami Maurice sauta à bas de son lit, mit ses pantoufles, et ferma vivement la fenêtre. Puis il essaya d'attraper le pigeon, mais celui-ci ne voulait pas se laisser prendre. Maurice avançait à quatre pattes sous la table, et le pigeon sautait sur le lit. Maurice faisait un pas

vers le lit et le pigeon s'envolait vers la cheminée. Mais surtout le gros oiseau était attiré par la lumière et venait se cogner contre les vitres. Maurice avait peur qu'il ne se fit du mal. Enfin il prit une décision énergique ; il arracha un des draps du lit et le jeta étendu sur le pigeon comme font les pêcheurs avec un de ces filets qu'on appelle un "épervier". Lorsqu'il se sentit pris, l'oiseau ne bougea plus. Alors vite, vite, Maurice prit un crayon qui se trouvait dans le tiroir de sa table, et se mit à écrire le message suivant : " Je suis Maurice Lefèvre, prisonnier des bandits qui m'ont enlevé à Sens, le samedi, 24 septembre, 1938. Ils m'ont emmené à environ vingt kilomètres vers le sud-ouest de Lyon. Je suis sain et sauf dans un château ",

### 3. PHONETICS (Optional)

*If you answer this Section you need answer only SIX of the twelve questions in Section 4.*

Transcribe into phonetic characters :

Le fermier travaille dans les champs. Il guide une moissonneuse que tirent deux forts chevaux. C'est une belle machine qui non seulement coupe le blé mais lie les gerbes, dont les laboureurs chargent un chariot. Une nuée de corneilles suit sans peur les hommes, pour se saisir des grains mûrs qui traînent.

### 4. GENERAL QUESTIONS

*If you have not answered Section 3 you should answer TEN of the following questions ; if you have answered Section 3 you should answer only SIX of these questions.*

*Each answer should be in French in the form of a complete sentence or complete sentences.*

- (a) De quoi a-t-on besoin pour écrire une lettre ?
- (b) Pourquoi est-il bon d'avoir un chien à la maison ?
- (c) Que voit-on dans une rue de ville ?
- (d) Nommez cinq sortes de légumes.
- (e) Qu'est-ce qu'un oncle ? une nièce ?
- (f) Comment passez-vous d'ordinaire votre temps libre ?
- (g) Que préférez-vous écouter à la Radio ?
- (h) Que fait un facteur ?
- (i) Quelles précautions faut-il prendre avant de traverser une rue ?
- (j) Que voyez-vous par la fenêtre de votre chambre à coucher ?
- (k) Que faites-vous pour vous soigner les dents ?
- (l) En quelle saison va-t-on (i) patiner ; (ii) nager ; (iii) en vacances de Pâques ?

[OVER

## 5. COMPREHENSION TEST

Read the following passage carefully and then answer *in French* the questions below. Do not translate the passage into English. Each answer should be in the form of a complete sentence or complete sentences.

En l'année 1716 vivait à Boston, capitale du Massachusetts, petite ville sérieuse, prospère, et la plus importante alors des colonies anglaises d'Amérique, un jeune garçon de dix ans qui se nommait Benjamin Franklin. Il était le plus jeune fils de Josiah Franklin, honnête marchand de chandelle et de savon qui, venu d'Angleterre, s'était marié deux fois et avait eu dix-sept enfants. Quelques-uns étaient morts ; aux aînés, il avait fait apprendre des métiers manuels ; quant au cadet, Benjamin, qui semblait intelligent comme tous les cadets, le père avait d'abord pensé à faire de lui un pasteur.

— Benjamin ira au Collège, avait-il dit.

Benjamin qui, dès l'enfance, avait eu le goût des livres, s'était vivement réjoui. Mais l'école coûtait cher, Josiah Franklin n'était pas riche et, au bout d'un an, il résolut de prendre son fils chez lui et de l'employer dans la boutique à couper les mèches des chandelles, à remplir les moules de cire et à faire les courses.

- (a) En quelle année Benjamin Franklin naquit-il ?
- (b) Pourquoi Josiah Franklin avait-il décidé d'envoyer son fils au Collège ?
- (c) Pourquoi Benjamin avait-il été content de pouvoir aller au Collège ?
- (d) Qu'est-ce qui empêcha Benjamin de devenir pasteur ?
- (e) Comment Benjamin devait-il aider son père dans la boutique ?
- (f) Pourquoi l'auteur décrit-il Boston comme "*petite ville sérieuse*" ?

# MINISTRY OF EDUCATION FOR NORTHERN IRELAND

## GRAMMAR SCHOOL CERTIFICATE EXAMINATIONS, 1951

### JUNIOR GERMAN

Time allowed—2½ hours

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*Sections 1, 2, 4 and 5 must be answered by all candidates ; candidates who answer the optional Section 3 (Phonetics) are required to answer only six of the thirteen questions in Section 4 instead of ten.*

#### 1. GRAMMAR AND TRANSLATION INTO GERMAN

(a) Supply endings where necessary :

- (i) Ein— Tag— sah ein— jung— Mädchen d—  
hell— Licht über d— groß— Hafen.
- (ii) Zwei glücklich— Kinder erhielten die ver-  
sprochen— Belohnungen und liefen schnell  
nach d— Stadt und in ein— Laden.
- (iii) Heiß— Tee schmeckt bei d— kalt— Wetter  
sehr gut.
- (iv) Er fragte d— alt— Mann „ Was für ein—  
komisch— Gut ist das ? ”



(b) Rewrite the following sentences, putting the verbs into (1) the future, (2) the imperfect :

Example: Sie holen.

(1) Sie werden holen.

(2) Sie holten.

- (i) Du fängst früh an.
- (ii) Wir werden seekrank.
- (iii) Er kann es machen.
- (iv) Ich bleibe hier.
- (v) Die Uhr schlägt sechs.

(c) Rewrite the following sentences, inserting the correct form of the adjective :

- (i) Dieser Baum ist am (groß).
- (ii) Ich habe das (drei) Gedicht auswendig gelernt.
- (iii) Er benimmt sich (gut) als sein Bruder.
- (iv) Dieser Turm ist hoch aber jener ist noch (hoch).
- (v) Meine Stimme ist laut aber er hat die (laut) Stimme von allen.

(d) Translate into German :

- (i) He called, "Who is there?" "It is I," she answered.
- (ii) I have had to buy these cakes at the baker's.
- (iii) That is not your book but mine.
- (iv) Although she knocked twice at the door no one answered.
- (v) They have gone by train to-day.

## 2. TRANSLATION INTO ENGLISH

Translate into English :

Zu der Zeit wohnte ich in der Großstadt bei meinem Onkel, der zu mir sehr streng war. Ich durfte nie spielen und er achtete darauf, daß ich tüchtig arbeitete. Ich besuchte natürlich eine Schule aber ich vertrug mich mit den Lehrern nicht gut.

Wenn ich von der Schule heimkam, mußte ich mich gleich hinsetzen und meine Schularbeiten machen. Einmal mußte ich eine Arithmetikaufgabe machen, die unerwartet schwierig war. Ich konnte sie einfach nicht lösen und deshalb bat ich meinen Onkel um Hilfe. Er rechnete fleißig den ganzen Nachmittag und schimpfte fürchterlich dabei. Erst vor dem Abendessen brachte er mir die Rechnung und sagte mürrisch: „Jetzt kannst du es abschreiben; es war eigentlich ganz leicht aber ich habe etwas anderes tun müssen, du Dummkopf!“

Ich habe es abgeschrieben und dem Lehrer gegeben; am Donnerstag bekam ich die Aufgabe wieder. Der Lehrer brüllte: „So eine dumme Rechnung kann bloß ein Esel machen!“

Ich antwortete ruhig: „Das war mein Onkel — er ist daran Schuld, denn er hat es gemacht und ich habe es dann abgeschrieben!“

Darauf brach die ganze Klasse ins heitere Gelächter aus und der Lehrer wurde auf einmal rot. „Du bist ein unverschämter Lügner!“ sagte er zornig. „Dafür werde ich dich zwei Stunden einsperren!“

[OVER

## 3. PHONETICS

(Optional)

*If you answer this Section you need answer only six of the thirteen questions in Section 4.*

Transcribe into phonetic characters :

Der Junge brach einen Zweig ab. Er hätte mehr abgebrochen, wäre seine Mutter nicht erschienen. Sie sagte ihm; „Du sollst heute zu Hause bleiben.“ Und das tat ihm leid.

## 4. GENERAL QUESTIONS

*If you have not answered Section 3 you should answer TEN of the following questions ; if you have answered Section 3 you should answer only SIX of these questions. Each answer should be in German in the form of a sentence or sentences.*

- (a) Beschreiben Sie einen Garten im Sommer oder im Frühling.
- (b) Was kann man in einer Bäckerei oder in einem Lebensmittelgeschäft kaufen?
- (c) Was machen Sie auf dem Schulweg oder während der Mittagspause?
- (d) Möchten Sie Lehrer werden? Warum oder warum nicht?
- (e) Warum gehen Sie zum Zahnarzt? Was macht der Zahnarzt, wenn Sie zu ihm gehen?
- (f) Welchen ziehen Sie vor — den Sommer oder den Winter? Warum?
- (g) Welche ist Ihre Lieblingsmahlzeit? Was essen Sie am liebsten dazu?

- (h) Was würden Sie machen, wenn Sie einen freien Nachmittag an der See oder auf dem Lande verbringen dürften?
- (i) Nennen Sie vier Zimmer in einer Wohnung und vier Stück Möbel.
- (j) Wenn Sie zehn Pfund hätten, was würden Sie damit kaufen?
- (k) Nennen Sie drei Sachen, die Sie machen können, um Ihrer Mutter bei der Hausarbeit zu helfen.

*If you choose one or both of the following questions, in each case write about TWENTY words in connected German containing the four given words in any form (Singular, Plural, etc.) and in any order you please.*

(l) Rahe — Milch — Durst — Hund.

(m) Vogel — Baum — Wind — Nest.

## 5. COMPREHENSION TEST

Read the following passage carefully, and then answer *in German* the questions below. Do not translate the passage into English. Each answer should be in the form of one or more complete sentences.

Der Bauer Rupert stand in seinem leeren Garten und klagte seinem reichen Nachbar seine Armut. Der Nachbar, der ein kluger Mann war, sprach: „Sieh, auf dem Platz, worauf du stehst, steckt ein Schatz von mehr als hundert Pfund im Boden. Mache nur, daß du ihn hebst!“

Rupert grub in der folgenden Nacht ein großes Loch in die Erde, aber er fand kein Geld, nicht einmal einen Pfennig.

Als der Nachbar am nächsten Morgen das Loch sah, lachte er laut und sagte: „Du dummer Mensch, so war es nicht gemeint — auf diese Weise findest du keinen Schatz. Ich will dir aber einen jungen Apfelbaum schenken; setze ihn in das Loch, das du gemacht hast, und nach einigen Jahren wirst du viel Geld haben.“

Rupert pflanzte den jungen Obstbaum und er wuchs und wurde ein großer herrlicher Baum. Die süßen Früchte, die er in den vielen Jahren getragen hat, brachten Rupert weit mehr als hundert Pfund und Rupert war seinem Nachbar ewig dankbar.

- (a) Warum hat sich Rupert bei seinem Nachbar beklagt?
- (b) Warum hat Rupert ein großes Loch in die Erde gemacht?
- (c) Warum hat der Nachbar laut gelacht?
- (d) Wie hat der Nachbar Rupert geholfen?
- (e) Wie lange mußte Rupert warten, bis er seinen Schatz bekam?
- (f) Wie ist der Apfelbaum zu einem Schatz geworden?



# MINISTRY OF EDUCATION FOR NORTHERN IRELAND

## GRAMMAR SCHOOL CERTIFICATE EXAMINATIONS, 1951

JUNIOR

IRISH

Time allowed — 2½ hours

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*ALL sections should be answered.*

### 1. GRAMMAR AND TRANSLATION INTO IRISH

(a) Rewrite the following sentences in the Plural :—

(i) Ćuairt an bean ós go dtí an t-aonac agus díol sí an bó dearg.

(ii) Nuair d'éirigh an fearac mór d'iarr ré ar an buachaill éirge forta.

(iii) Bí fear 'na fearam ar barr an chúic móir.

(b) Turn the following into the Future :

(i) Pórad é féin agus níghean an ríog. Bí banair aca a mair lá agus bliadain agus bí an lá deireannac com mair leir an céad lá.

(ii) Ćuairt an bean glar amac 7 d'iarr sí air teacht cuig a hinneár agus táinig ré fa deiread.

(c) Turn the following into the Conditional with *rudairt* ré go : Ćuairt ré amac agus fuair ré an t-éan. Tóg ré é agus cuir in-a póca é.

(d) Translate the following sentences :

(i) My brother is two years older than I.

(ii) Once upon a time there was a king in Ireland whose name was Art.

(iii) I live in the city but I prefer the country.

(iv) Yesterday I met a man who had a pig.

(v) I don't know where I was born but I am now fifty years of age.

## 2. TRANSLATION INTO ENGLISH

Translate into English :

1 b'fao ó foin bí luódg irtoig i gcruaidé coirce. Lá amáin ran earraic bí rí ag rgiobaó amac an coirce.

Ói fuireóg ag sabáil tairt ar eiteóg. Cá raó a óat le faóáil aici le hite. O'iair rí ar an luódg coirce a rgiobaó amac ói a fáo ir máirfeao an ramraó, agus nuair a tiocfaó an t-earraic go bfuigeao ríre a curó don luódg.

Nuair a táinig an ramraó, bí a ráit ag an fuireóg agus o'iair an luódg beagán uiréi.

Rinne an fuireóg feao agus dubairt rí naó raó áiré aici ar an luódg. Dubairt an luódg go gcuirfeao rí cogao uiréi. Dubairt an fuireóg go raó rin maí go leor.

Cruinnig an luódg na hainmíóte ceitire scor, agus cruinnig an fuireóg na héanaca a bí ar an aer. Ói ráo le cogao a óeánam or coinne doirar Ríog Éireann.

## 3. GENERAL QUESTIONS

Answer, in Irish, any *ten* of the following questions. (No answer should exceed four or five lines).

- (a) Soiré bíor an t-iarraire a óeánam?
- (b) Soiré tá le feiceáil ó bairé énuic?
- (c) Soiré tá le feiceáil i gcirtinig?
- (d) Cía aca ir fearr leat an tuait nó an cátair agus cao cuige?
- (e) Cía aca ir fearr leat mar peata—maoao nó cat—agus cao cuige?
- (f) Soiré bíor an gnearraide b'óg a óeánam?
- (g) Soiré gníor an coileac ar maoin?
- (h) Soiré bíonn tú a óeánam 'ran tsamraó?
- (i) Soiré bíor an fearmeóir a óeánam 'ran fógmar?
- (j) Sgníob cupla focal i doiré b'él fearre.
- (k) Soiré an feóir ainmíde coinín?
- (l) Soiré an cluice ir fearr leat?

## 4. COMPREHENSION TEST

Read the following passage carefully, and then answer, *in Irish*, the questions below. Do not translate the passage into English.

Each answer should be in the form of a complete sentence or sentences.

Bí Peadar 'na cónnuirde i Maíoe b'án fada ó roin. Lá amáin cuairt ré cuig an donaí. Ar an donaí t'ól ré go maí ré ar meirge.

Bí ré a' teac't a'baile 'ran trucail leir féin i t'úr na hoiríoe, a'gur, i n'óirí tamail tuit ré 'na c'oilao.

Cuairt an gearrán ar a'gairt go t'áinís ré go bun c'nuic m'óir, a'gur r'ead ré annrín.

Cár b'ada go t'áinís g'aduirde t'art, a'gur, nuair a c'onnaic ré an fear 'na c'oilao, bí a' f'ior a'ise go maí an tuine boct ar meirge, a'gur r'gaoil ré an gearrán ar an trucail, léim ré ar a' t'huim, a'gur ar go b'at leir.

Go moí ar maíoin m'ur'ail Peadar a'gur é ar c'rit leir an b'uaí.

- (a) Goiríe pinne Peadar ar an donaí?
- (b) Cao cuige ar tuit ré 'na c'oilao?
- (c) Cao cuige ar r'ead an gearrán?
- (d) Goiríe mar bí a' f'ior a' an g'aduirde go maí Peadar ar meirge?
- (e) Cao cuige ar r'gaoil ré an gearrán ar an trucail?
- (f) Cao cuige ar m'ur'ail Peadar ar maíoin?

# MINISTRY OF EDUCATION FOR NORTHERN IRELAND

## GRAMMAR SCHOOL CERTIFICATE EXAMINATIONS, 1951

### JUNIOR SPANISH

Time allowed—2½ hours

*ALL sections should be answered.*

#### 1. GRAMMAR AND TRANSLATION INTO SPANISH

- (a) Rewrite, changing the words in italics to the plural :
- (i) *El profesor vendió su bicicleta.*
  - (ii) *La niña era bonita.*
  - (iii) ¿Cómo se llama el vecino del juez?
  - (iv) *Me gusta esta flor azul.*
- (b) Rewrite in the past definite :
- (i) ¿Cuánto dinero tiene María?
  - (ii) Pablo me ayuda con mis estudios.
  - (iii) No quiero la pluma verde.
  - (iv) Los muchachos son ricos.
- (c) Rewrite the following sentences, changing the nouns to pronouns :
- (i) Tengo el cuadro.
  - (ii) ¿Quién escribe la palabra?
  - (iii) ¡Compren Vds. los billetes!
  - (iv) No leen las cartas.

(d) Translate :

- (i) It was cold in the kitchen and I was hungry and sleepy.
- (ii) The grey kittens like milk and fish.
- (iii) Peter cannot buy a donkey, he hasn't any money.
- (iv) Anthony is fifteen years old.
- (v) Who was learning to speak Spanish ?
- (vi) We used to spend the morning working and the rest of the day swimming and dancing.
- (vii) What time is it ? It's five past nine.
- (viii) John is not in the garden.

## 2. TRANSLATION INTO ENGLISH

Translate into English :

En la calle Farel tiene su casa y su fábrica el padre de Ernesto. Durante toda la semana Ernesto trabaja preparando las lecciones para explicarlas en el colegio. Los domingos, las tardes lluviosas y tristes del otoño y del invierno, son para él momentos felices.

Entra en el café, lee los periódicos franceses y alemanes, mientras saborea una taza de café, y después juega a las cartas con los amigos. Pasadas las primeras horas de la tarde del domingo en el café, Ernesto se marcha en el tranvía a Carrouge a ver a sus amigos.

Algunas noches, sobre todo los sábados, Ernesto va a buscar a Sacha y a Vera y las acompaña al teatro. Muchas veces los tres van a pasear, a contemplar los jardines y las terrazas llenas de flores. El sol dorado del crepúsculo brilla en las cristalerías de los hoteles ; los árboles del paseo van despojándose de sus hojas amarillas y mostrando sus troncos negros por entre su ramaje desnudo.

## 3. GENERAL QUESTIONS

Answer, in Spanish, any *ten* of the following questions :

- (a) ¿Cuál es la ciudad capital de España ?
- (b) Enumerar tres idiomas que se hablan en Europa.
- (c) ¿ Cuántas horas tiene un día ?
- (d) ¿ Cuáles son los meses que tienen treinta y un días ?
- (e) ¿ Cómo se llamaba el caballo de Don Quijote ?
- (f) ¿ En qué país nació Shakespeare ?



- (g) ¿ A qué hora se levanta Vd. ?
- (h) ¿ Cuántas habitaciones hay en su casa de Vd. ?
- (i) ¿ Qué tiempo hace hoy ?
- (j) ¿ Sabe Vd. tocar un instrumento músico ?
- (k) ¿ Qué estudia Vd. en la escuela ?
- (l) Enumerar cuatro cosas que Vd. come cada día.

#### 4. COMPREHENSION TEST

Read the following passage carefully and then answer, *in Spanish*, any six of the questions below. Do not translate the passage into English. Each answer should be in the form of a complete sentence or sentences.

Un pastor de la Arabia, llamado Alimek, estaba en un campo con su ganado cuando se aperció de que en aquel lugar había una cueva. Se determinó a entrar en ella. En la cueva halló una bolsa llena de oro y unos diamantes. Tomó la bolsa y los diamantes y salió de la cueva.

—Adios, campos y bosques—dijo el pastor, lleno de alegría.—Ya soy rico, voy a viajar.

Después de haber viajado mucho se estableció en la ciudad de Golconda. Había allí una princesa de tanta hermosura que todos decían que era la mujer más hermosa del Asia. Alimek, al momento que la vió, se enamoró de ella. La magnificencia con que se presentó Alimek al palacio, sus maneras elegantes y su conversación llamaron la atención de Selima, la princesa, la cual halló tan agradable la compañía de Alimek que le invitó a pasar algunas semanas allí. Él, por su parte, mostró a la princesa toda atención. Pero los señores del palacio presentaron a Alimek ante los ojos de la princesa como un hombre falso y malo, y el pobre Alimek se marchó muy triste de Golconda.

- (i) ¿ En qué país vivía Alimek ?
- (ii) ¿ En qué continente se halla Arabia ?
- (iii) ¿ Quedó el pastor en su país después de hallar el tesoro ?
- (iv) ¿ En qué ciudad se estableció finalmente Alimek ?
- (v) ¿ Por qué se enamoró Alimek de la princesa ?
- (vi) ¿ Qué cualidades llamaron la atención de la princesa ?
- (vii) ¿ Eran buenos los señores del palacio ?
- (viii) ¿ Se marchó Alimek alegre de Golconda ?

# MINISTRY OF EDUCATION FOR NORTHERN IRELAND

## GRAMMAR SCHOOL CERTIFICATE EXAMINATIONS, 1951

### JUNIOR HISTORY

Time allowed—2½ hours

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*EIGHT questions should be answered.*

*Candidates should answer all FOUR questions in Section A, together with TWO from Section B and TWO from Section C.*

*Candidates should be careful to give each question and its different parts the correct number or letter.*

#### SECTION A

*All FOUR questions in this Section should be answered.*

1. Write down each of the following sentences and complete it with the correct date taken from the list of dates below :—

- (a) The Union of South Africa was completed in.....
- (b) The Declaration of American Independence was issued in .....
- (c) The accession of Mary Tudor took place in.....
- (d) Gladstone's first Irish Land Act was passed in.....
- (e) The Treaty of Utrecht was signed in.....
- (f) The Crimean War ended in.....
- (g) The Battle of Bosworth was fought in.....
- (h) The Hampton Court Conference first met in .....

1856, 1910, 1776, 1713, 1485, 1553, 1604, 1870.

(16 marks)

2. Write a *paragraph* of *about five lines* on each of *four* of the following people : state clearly who he was : describe briefly the part he played in some historical event : and give the century in which the event took place :—

Richard Cobden ; William Laud ; Richard Arkwright ; Edmund Burke ; David Livingstone ; Sir Francis Drake ; John Churchill, first Duke of Marlborough ; “ Silken Thomas.”

(60 marks)

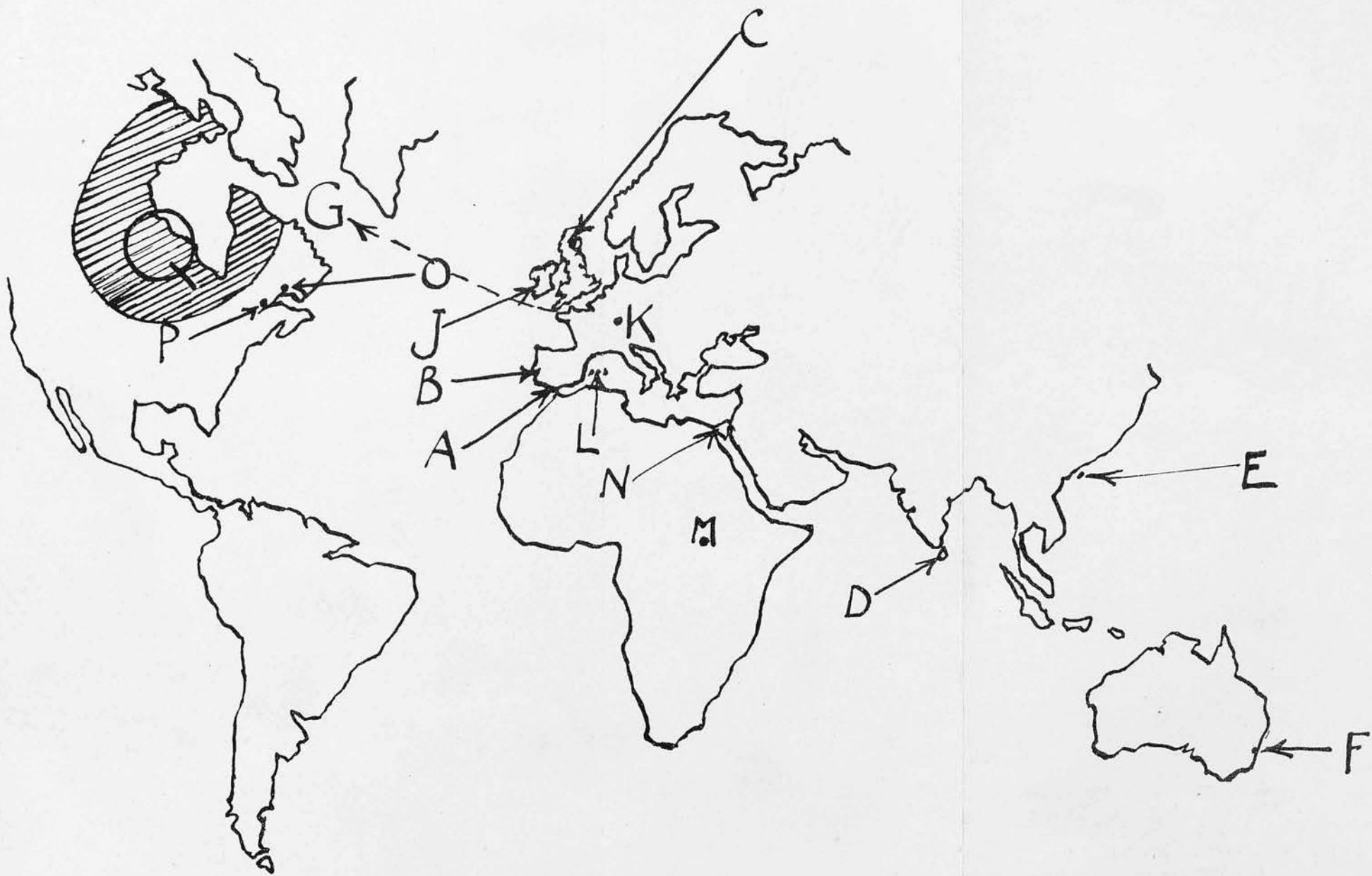
3. Study the sketch map supplied and answer the following questions, *not on the map itself, but in your answer book* :—

- (a) Name the two places A and B where British armies withstood French attacks during the periods 1779–1783 and 1810–1811 respectively.
- (b) Name the place C where Prince Charles Edward Stuart was finally defeated.
- (c) Name the places D and E which became British possessions in 1815 and 1842 respectively.
- (d) Name *two* sixteenth century explorers who sought to find a sea-route to the Far East in the direction G.
- (e) What French general in 1796 tried to land at J ?
- (f) Name the place K where Marlborough defeated the French in 1704.
- (g) Name the island L the loss of which led to the execution of an English Admiral.
- (h) Name the canal at N linked with the name of Disraeli.
- (i) What places O and P were captured by the British in 1759 and 1760 respectively ?
- (j) For what purpose did Britain start a settlement at F in 1788 ?
- (k) Name the British Trading Company operating in region Q.
- (l) Name the place M where British and French clashed in 1898.

(32 marks)

4. Answer briefly the following :—

- (a) Whose name do you link with (i) the Star Chamber ; (ii) the Long Parliament ; (iii) the Surrender at Yorktown ; (iv) the People's Budget, 1909 ?
- (b) Name *one* historical event associated with (i) Thomas Cromwell ; (ii) Prince Rupert ; (iii) Lord North ; (iv) Wolfe Tone.



(c) Give *two* reasons why :—

- (i) Henry VII tried to amass great wealth ;
- (ii) The Plantation of Ulster took place ;
- (iii) Dutch and English fought each other during the seventeenth century ;
- (iv) The Crimean war broke out.

(32 marks)

### SECTION B

*Two questions should be chosen from this Section.*

*Each question in this Section carries 65 marks.*

5. Indicate (a) the steps taken by Henry VII and Henry VIII to increase their revenues, and (b) the success of their endeavours.

6. Describe the changes in religion in England between 1547 and 1563.

7. Why were England and Spain unfriendly in the reign of Queen Elizabeth ?

8. Give the main reasons why James I quarrelled with his Parliaments.

9. Trace the course of events *either* between 1628 and 1649 *or* between 1649 and 1660.

10. For what reasons is the reign of Charles II to be regarded as a notable one in English history ?

11. Write an informative note on *one* of the following :—

Mary, Queen of Scots ; Hugh O'Neill, Earl of Tyrone (c. 1540–1616) ; Irish Plantations before 1640 ; English Colonies in North America in the seventeenth century ; the deposition of James II ; John Milton.

12. Outline the main events of Irish history between 1660 and 1700.



## SECTION C

Two questions should be chosen from this Section.  
Each question in this Section carries 65 marks.

13. Indicate the immediate consequences of the accession of the Hanoverians to the British throne.

14. Show why *either* William Pitt, the Elder *or* William Pitt, the Younger is to be regarded as important in British history.

15. *Either*

(a) Describe the conditions under which in the early nineteenth century Irish tenant farmers *or* English factory workers lived.

[Pay heed to housing, food, dress, and working conditions.]

*Or*

(v) Account for the growth of textile industries in the eighteenth century.

16. Indicate *three* tasks of the British navy in war-time and show how they were carried out *either* in the Seven Years' War *or* in the Napoleonic War.

17. Name *four* prime ministers between 1815 and 1914: select *one* and describe *four* of his most important achievements.

18. State what you know about *one* of the following:—

Grattan's Parliament; the Peninsular War; the aims and activities of the Irish Land League; Education in Ireland since 1831; the career of Joseph Chamberlain; a modern Irish writer.

19. Describe briefly *four* outstanding events in the history of the British Empire between 1866 and 1914.

20. Write an informative note on each of *two* of the following:—

Excise Bill (1733); Robert Clive; George Washington; the Chartists; the *Triple Entente*; Parliament Act (1911).

# MINISTRY OF EDUCATION FOR NORTHERN IRELAND

## GRAMMAR SCHOOL CERTIFICATE EXAMINATIONS, 1951

### JUNIOR

### GEOGRAPHY

Time allowed—2½ hours

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*Answer SEVEN questions only.*

*Answer all THREE questions in Section A and ONE from each of the Sections B, C and D. Choose the seventh question from B, C or D.*

*Wherever possible, illustrate your answers by sketch maps and diagrams. If you do not do this you may lose marks.*

*Each question in Section A carries 60 marks : each question in Sections B, C and D carries 55 marks.*

#### SECTION A

*Answer all three questions in this Section.*

1. This question is on the reverse side of the contour map.

2. On the accompanying contour map :—

- (a) Number the five contours which have a blank space left in them.
- (b) Insert the streams that are not already marked on the map.
- (c) Mark and name the following :—
  - (i) a ridge ;
  - (ii) a cliff over 100 ft. high ;
  - (iii) a knoll ;
  - (iv) a col ;
  - (v) a small peninsula ;
  - (vi) a very steep slope.
- (d) Shade in an area in which you would expect to find sand dunes.
- (e) Mark the best site for a port with an X.

3. (a) On the map of the world provided, mark clearly and name the following :—

Cairo, River Yangtse, Korea, Rome, Panama Canal, New Orleans, the Australian Desert, Karachi, the International Date Line, Stockholm.

(b) On the map of the British Isles provided, there are marked :—

- (i) five towns (by dots) ;
- (ii) a coalfield (in black) ;
- (iii) two districts, one of high land, one of low land (by shading) ;
- (iv) two rivers (by lines marking their courses).

Write the name of each town, river, coalfield, and district beside it on the map.

(N.B.—The dotted lines on the map refer to question 5.)

*Answer ONE question from each of the three Sections B, C and D and a fourth question from either B, C or D.*

#### SECTION B

4. Write an account of

*Either* (a) the Yorkshire, Nottingham, and Derby coalfield ;

*Or* (b) the Midland coalfields of England.

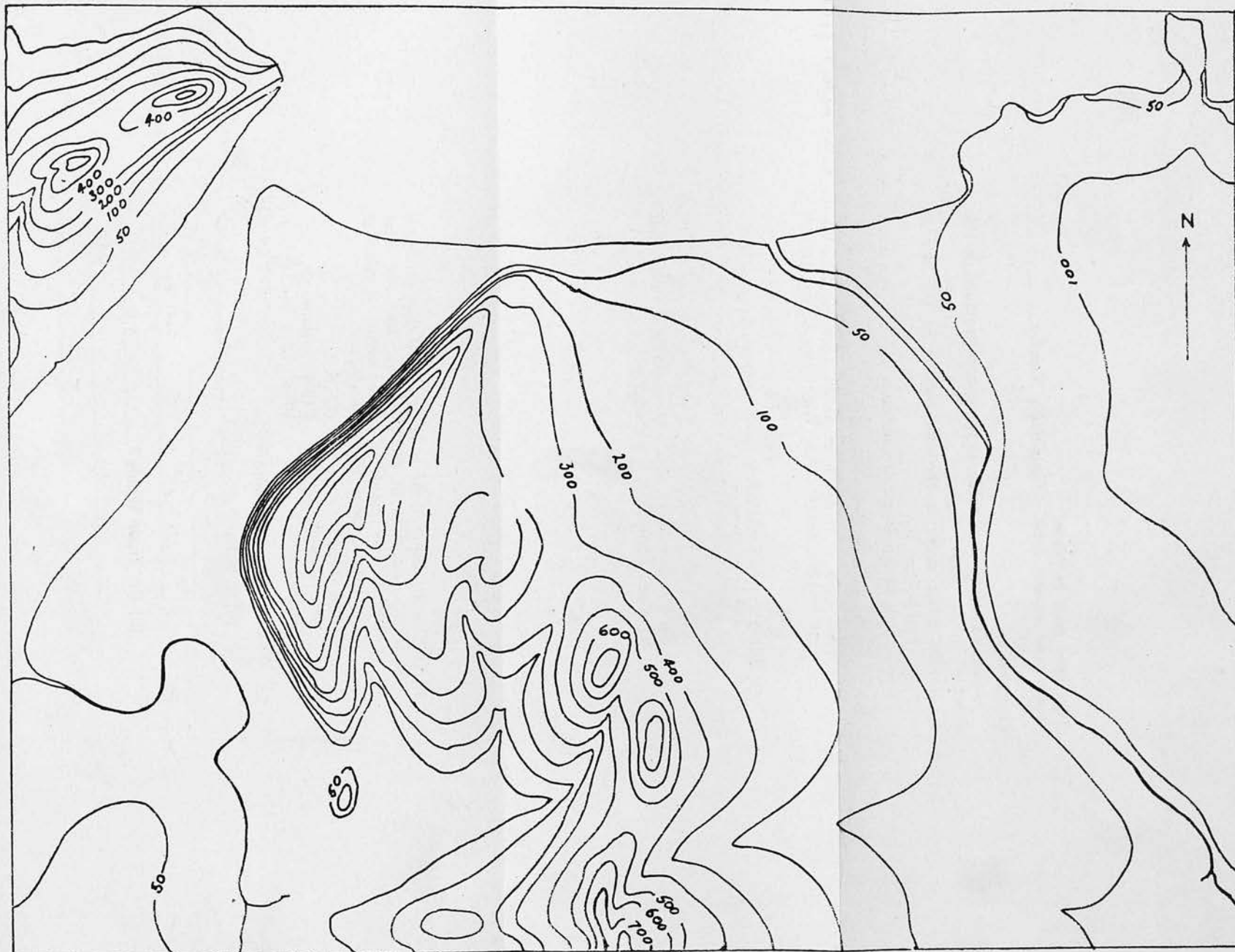
Use the headings :—

- (i) Relief ;
- (ii) Industries on or near the coalfields ;
- (iii) Communications and markets for the coal.

This sheet must be placed inside your answer book.

Question 2.

Candidate's Number .....



1 2 3 MILES

(C34009)

(Question 1 is overleaf.)

*This sheet must be placed  
inside your answer book. Candidate's Number.....*

Question 1.

Answer as briefly as possible, in the spaces provided on this sheet :—

(a) On what dates is the sun highest in the sky at midday :—

(i) at the Tropic of Capricorn ?.....

(ii) in Northern Ireland ?.....

(b) What type of climate is found between latitudes 20° and 30° North on the West side of a continent ?  
.....

(c) What type of rainfall is most common in :—

(i) the lower Ganges valley ? .....

(ii) the central Congo Basin ?.....

(d) Draw a rough sketch of a section across a valley that has been occupied by a glacier :—

(e) In the list below there is *one* country that produces large quantities of frozen meat, and *one* that produces large quantities of cane sugar. Underline the names of these two countries :—

Gold Coast.	U.S.S.R.
New Zealand.	British Guiana.
Germany.	Iraq.

(f) What do you understand by :—

(i) an isobar ? .....

.....

.....

(ii) the Trade Winds ? .....

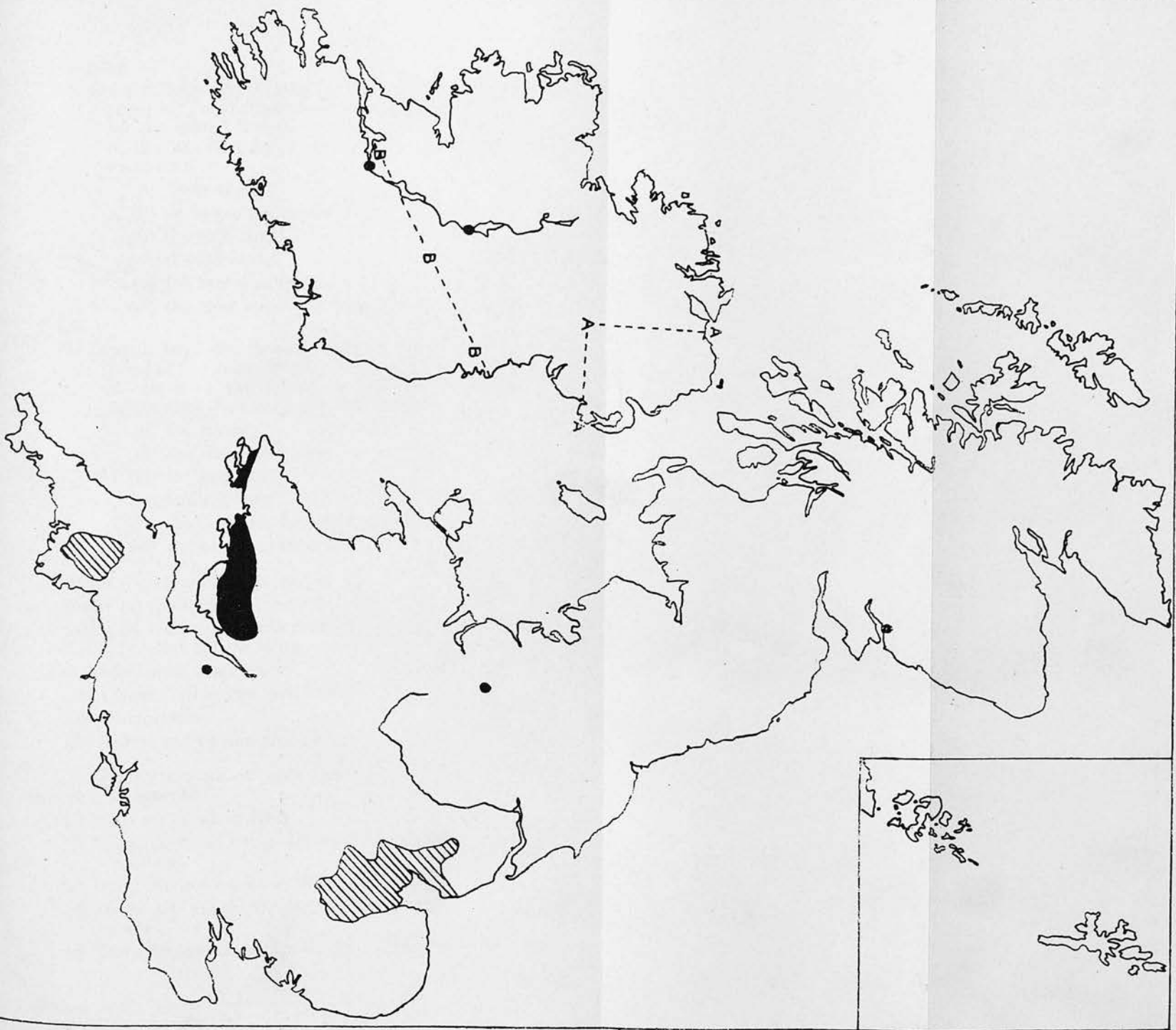
.....

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This sheet must be placed inside your answer book.  
Question 3 (b).

Candidate's Number



## 5. EITHER

(a) Draw a large sketch map (not less than a full half page) of North Eastern Ireland—the area marked by the dotted line A—A—A on the outline map of the British Isles in question 3—and mark and name on it :—

- (i) Three rivers ;
- (ii) six important towns ;
- (iii) the high land ;
- (iv) the railways ;
- (v) the best area for flax growing ;
- (vi) the most important industrial area.

OR

(b) Draw a large sketch map (not less than a full half page) of Southern Ireland—South of the line marked B—B—B on the outline map of the British Isles in question 3—and mark and name on it :—

- (i) five rivers ;
- (ii) five important towns ;
- (iii) the high land ;
- (iv) two railways ;
- (v) the best area for dairy cattle ;
- (vi) the best area for crops.

## 6. Write a geographical account of

*Either* (a) the Basin of the Great Ouse ;

*Or* (b) the Severn Basin (including the Warwick Avon, but not the Wye).

Use the following headings :—

- (i) Course, Tributaries, and Relief ;
- (ii) Occupations ;
- (iii) Towns and Communications.

7. Give *three* reasons in each case for *any three* of the following statements :—

- (a) Hops are grown in Kent.
- (b) Water power is being developed in the Highlands of Scotland.
- (c) Dairy cattle are kept in the Solway Plain.
- (d) There are many co-operative creameries in County Cork.
- (e) Early flowers are grown in the Channel Islands.

[OVER

## SECTION C

ONE question at least but NOT MORE THAN TWO should be chosen from this Section.

8. Draw a large sketch map of  
*Either* (a) Holland and Belgium ;  
*Or* (b) The North German Plain.

Show on it :—

- (i) Relief and Rivers ;
- (ii) Towns ;
- (iii) Main routes ;
- (iv) Mineral deposits ;
- (v) The most important crops in the areas where they are grown.

9. Write a geographical account of  
*Either* (a) The Deccan of India ;  
*Or* (b) Honshiu (the main island of Japan).

Use the headings :—

- (i) Position ;
- (ii) Relief ;
- (iii) Climate ;
- (iv) Occupations and Towns.

10. Write an account of the position, relief, climate, and occupations and towns of

- Either* (a) Switzerland ;  
*Or* (b) The Hungarian Basin ;  
*Or* (c) Peninsular Italy.

11. Give *three* reasons in each case for *any three* of the following facts :—

- (a) Wheat is grown in Ukraine.
- (b) Rice can be grown in Northern Italy.
- (c) Silk is manufactured in the Rhone valley.
- (d) Wine is made in the Rhine valley.
- (e) Cattle are *not* important in South Eastern Spain.

12. Choose *two* large capital cities (excluding Brussels, Berne, Budapest, Berlin, and Rome) that are situated on rivers on the mainland of Eurasia. Describe their positions and account for their importance.

## SECTION D

ONE question at least but NOT MORE THAN TWO should be chosen from this Section.

13. Write a geographical account of the relief, climate, and occupations of *one* of the following :—

- (a) The Cotton States of U.S.A.
- (b) Africa, South of the Tropic of Capricorn (*i.e.*, mainly the Union of South Africa).
- (c) The New England States (of U.S.A.).

14. Draw a large sketch map of South America, showing the division into climatic regions. Describe and explain the climate of *one* region which is not a desert, naming the chief products grown or cultivated.

15. Write notes, and, if necessary, draw maps to illustrate them, about *any two* of the following :—

- (a) The White Australia Policy.
- (b) The trade of the Great Lakes of North America.
- (c) Sheep farming in Australia.
- (d) Tinned fruit production in U.S.A.

MINISTRY OF EDUCATION FOR  
NORTHERN IRELAND

GRAMMAR SCHOOL CERTIFICATE  
EXAMINATIONS, 1951

JUNIOR

ARITHMETIC

Time allowed— $2\frac{1}{2}$  hours

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*ALL questions should be answered.*

*All questions carry equal marks.*

*All calculations must be made on the answer books and pads provided and all important calculations should be clearly and legibly displayed. Full marks will be awarded for a correct answer only when the method used is clearly shown.*

*The use of logarithms is compulsory in Question 9. Logarithms may **NOT** be used in the working of any other question.*



1. 3,502 names, numbered consecutively, are to be entered in a Book of Names. Each page has 37 lines and on each line one name is to be written.

- On how many pages will names be written?
- How many lines, on the last page used, will be left blank?
- What will be the number of the first name on the thirtieth page?
- What will be the exact position of the three thousandth name?

2. The table below gives details of the mail posted from a certain office on five successive days.

	Circulars, 1 <i>d.</i> each.	Letters, 2½ <i>d.</i> each.	Registered Packets, 6½ <i>d.</i> each.	Parcels, 1 <i>s.</i> 4 <i>d.</i> each.
Monday ..	40	8	2	Nil
Tuesday ..	Nil	14	3	3
Wednesday	Nil	22	1	4
Thursday ..	64	6	1	Nil
Friday ..	Nil	12	5	2

- Calculate the total postage for each day and also the total postage for the five day period.
- What would have been the total postage for this period had the rate for letters been 1½*d.* each and that for registered packets 4½*d.* each?

3. (a) Express 15*s.* 6*d.* as a decimal of £1.

(b) Find, in lb., 3 per cent of 2 tons 1 cwt. 8 lb.

(c) Find the Simple Interest on £32 for ¼ year at 2½ per cent per annum.

(d) How long is it, in hours and minutes, from 7-32 a.m. on MONDAY till 2-23 p.m. on the following WEDNESDAY?

4. (a) Find the area of a triangle of base 7 inches and perpendicular height  $4\frac{1}{4}$  inches.

(b) Taking  $\pi$  as  $\frac{22}{7}$ , find the area of a circle of radius  $9\frac{5}{8}$  inches.

(c) How many bottles each holding  $\frac{1}{3}$  pint can be filled from a vessel containing 8 gallons 3 quarts?

(d) Find the average speed in miles per hour of a car that covers 22 yards in 1 second.

5. The table below gives the costs at which the specified numbers of meals can be provided from two kitchens, A and B.

On one set of axes plot graphs from these values, using £10 per inch for one scale and 200 meals per inch for the other.

Find, from the graphs, the number of meals for which the cost is the same in the two kitchens. State this cost.

Number of Meals.	Kitchen A. Cost in £'s.	Kitchen B. Cost in £'s.
100	$16\frac{1}{4}$	33
200	$21\frac{1}{2}$	40
400	33	51
700	54	63
900	$72\frac{1}{2}$	69
1,100	—	73

6. The captain of a ship sailing at 16 knots on a north-easterly course is ordered by wireless to sail, at 10 knots, due north for 4 nautical miles and then due east, at 10 knots, for the same distance. He is finally to resume his north-easterly course at his former speed.

(a) How many nautical miles, correct to the second decimal place, are added to the ship's course by this diversion?

(b) How much time, correct to the nearest minute, is lost?

(1 knot = 1 nautical mile per hour.)

[OVER

7. On 2nd March a sum of money was lent at  $3\frac{3}{4}$  per cent per annum simple interest. On and from 15th May the rate of interest was lowered to  $3\frac{1}{4}$  per cent per annum. On 19th December the accumulated interest was £4 1s. 0d. What sum was lent?

8. A cylindrical storage tank has a diameter of 18 feet and a height of 12 feet. It is replaced by another cylindrical tank with 60 per cent more capacity. If the new tank has a height of 15 feet what, to the nearest inch, must its diameter be?

9. (a) Using log tables, calculate, correct to the second decimal place, the value of:—

$$(i) 3.961 \times 0.0469.$$

$$(ii) \frac{3.961 \times 0.0469}{18.65 \times 0.1865}.$$

(b) Given  $V = \sqrt{\frac{2ghD}{0.03L}}$  calculate, correct to the second decimal place, the value of  $V$  when  $g = 32.2$ ,  $h = 0.63$ ,  $D = 0.27$  and  $L = 175$ .

10. An experiment to determine the stress in a metal gave as a result  $\frac{1,350}{0.0495}$  lb. per square inch. If each of these numbers is liable to a 2 per cent error either way, find, correct to 3 significant figures, the greatest and the least values that the stress could have.

MINISTRY OF EDUCATION FOR  
NORTHERN IRELAND

GRAMMAR SCHOOL CERTIFICATE  
EXAMINATIONS, 1951

JUNIOR

ALGEBRA

Time allowed— $2\frac{1}{2}$  hours

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*ALL questions should be answered.*

*All questions carry equal marks.*

1. (a) If  $x = -1$ , what is the value of  $x^4 - x^2 + 1$ ?

(b) Evaluate  $a^3 + b^3 + c^3 - 3abc$  when  $a = 1$ ,  $b = 2$ , and  $c = -1$ .

(c) If  $n = 1.5$ ,  $r = 25$ , and  $s = -50$ , calculate  $f$  from the formula

$$\frac{1}{f} = (n - 1) \left( \frac{1}{r} - \frac{1}{s} \right).$$

2. (a) A man's income is £P a year. If he spends on an average  $m$  shillings a month, what sum of money, in pounds, does he save in a year?

(b) A load of gravel is sufficient to cover  $s$  square yards when it is spread  $t$  inches thick. What area would it cover if it were spread  $k$  inches thick?

(c) Find the length of paper,  $w$  feet wide, needed for the walls of a room  $l$  feet long,  $b$  feet broad, and  $h$  feet high, assuming that doors and windows account for an area  $A$  square feet on the walls.

3. (a) Find a value of  $x$  which satisfies the equation

$$7(3x - 13) - 4(x - 3) = x + 7.$$

- (b) Solve for  $x$  and  $y$  the equations

$$\frac{1}{3}(x + 4) - y = 5, \quad x - \frac{1}{4}(y - 1) = 3.$$

4. (a) Factorise (i)  $x^2 + 2x - 35$  ;  
 (ii)  $a^2 - 5a - ab + 5b$  ;  
 (iii)  $y^2 + 2y + 1 - z^2$ .

(b) Given that  $2x - 3$  is a factor of  $8x^3 - 10x^2 - 13x + 15$ , find two other factors of this expression.

5. (a) Find the missing term in each of the following expressions so that each complete expression may be a perfect square :—

- (i)  $x^2 + 14xy + ?$ .  
 (ii)  $x^2 + ? + y^2$ .  
 (iii)  $? + 12xy + 9y^2$ .

(b) Find, without using a formula, two values of  $x$  such that  $3x^2 - 7x$  is equal to 100. Give the values correct to two decimal places.

6. In a certain cinema the evening charge for admission to the balcony is 1s. 6d. and to the stalls 1s., and when the house is full, total takings are £35. The afternoon charges for admission to balcony and stalls are 1s., and 9d., respectively, and total takings from a full house are now £25. Find the total takings for an evening performance at which the balcony is half full, and the stalls are three-quarters full. (Assume no standing is allowed.)

7. (a) "If three consecutive whole numbers are multiplied together, and the middle number is added to the result, the total is equal to the cube of the middle number."

- (i) Show that the above statement is true for the numbers 8, 9, 10.  
 (ii) Express the statement in algebraic terms, and hence show that it is always true.

(b) If brine is formed by dissolving  $p$  pounds of salt in  $q$  pounds of water, how many pounds of salt are needed to make  $q$  pounds of brine? (Assume that there is no loss of weight when the solution is formed.)



8. (a) Find the values of  $a^{-3}$ ,  $a^0$ , and  $a^{\frac{2}{3}}$  when  $a = -8$ .

(b) Simplify

$$\frac{\sqrt{3}}{\sqrt{3} + \sqrt{2}} + \frac{\sqrt{2}}{\sqrt{3} - \sqrt{2}}.$$

(c) Find  $x$  from the equation

$$\log_{10} x^2 + \log_{10} x^3 = 15.$$

9. (a) If  $y = x + \frac{6}{x}$ , draw up a table of values of  $y$  for  $x = 1, 2, 3, 4, 5, 6$ .

(b) Draw a graph of  $y$  for values of  $x$  between  $x = 1$  and  $x = 6$ .

(c) Obtain from the graph the approximate value of  $x$  for which  $y$  is least, and write down the minimum value of  $y$ .

(d) Find from your graph approximate values of the roots of the equation

$$x + \frac{6}{x} = 5.25.$$

10. A man is walking along a road at a uniform rate of 6 feet per second. 16 feet ahead of him he sees a cyclist starting off. If the cyclist moves in such a way that after  $t$  seconds he has travelled  $\frac{1}{2}t^2$  feet, prove that the man who is walking will pass the cyclist and that he will afterwards be repassed by the cyclist. Find the times of passing and repassing.

# MINISTRY OF EDUCATION FOR NORTHERN IRELAND

## GRAMMAR SCHOOL CERTIFICATE EXAMINATIONS, 1951

### JUNIOR

### GEOMETRY

Time allowed— $2\frac{1}{2}$  hours

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*TEN questions should be answered. Girls may choose either or both of Questions 11 and 12 instead of any of Questions 1 to 10.*

*All questions carry equal marks.*

1. (a) Define (i) a triangle, and (ii) an equilateral triangle. State one other property of an equilateral triangle.

(b) The shorter diagonal of a rhombus divides it into two equilateral triangles of side 2 in. Find, in surd form, the length of the other diagonal.

2. Draw a parallelogram ABCD and join AC. Produce DC to E, making  $DC = CE$ . Join BE.

(a) Write down two angles each equal to  $\hat{ADC}$ .

(b) Prove that the triangles ADC, BCE are congruent.

(c) Prove that BE is parallel to AC.

3. (a) In the triangle ABC the angle A is  $40^\circ$  and the angle C is  $65^\circ$ . A line is drawn perpendicular to AB meeting AB in L, AC in M and BC produced in N. Calculate angle MNC.

(b) In the triangle XYZ the base YZ is fixed and is 4 in. long. The area is 5 sq. in. What is the height of the triangle? What is the locus of X? If the angle Y is  $56^\circ$ , use your protractor to make an accurate drawing of this triangle.

4. Two chords AB, CD of a circle meet at X *outside* the circle. *State* the relation between the distances from X to A, B, C and D.

P is a point outside a circle of centre B. PB cuts the circle in A and C, A being nearer P than C. PA is 8 in. and the tangent from P to the circle is 12 in. Calculate the length of the radius.

5. A cyclic quadrilateral ABCD has AB longer than CD, and AD longer than BC. The sides AB, DC are produced to meet in P and the sides AD, BC are produced to meet in Q. Angle BAD is  $70^\circ$  and angle BPC is  $32^\circ$ . Calculate :—

- (a) angle BCD ;
- (b) angle PBC ;
- (c) angle CDQ ;
- (d) angle CQD.

6. (a) The two shorter sides of a right-angled triangle are 3 in. and 4 in. long. Use tables to find the smallest angle.

(b) When the sun's elevation is  $37^\circ$ , a flagpole casts a shadow 45 ft. long. Calculate the height of the flagpole, to the nearest 3 in.

7. The rectangle ABCD has AB, CD for its longer sides. A point X is taken in CD and the perpendicular bisector of AX is drawn meeting AB in P and AD in Q. AD is 3 in. long and angle APQ is  $35^\circ$ .

(a) Find  $\hat{PAX}$  and  $\hat{QAX}$ .

(b) Use tables to calculate the lengths of AX and PQ, giving each answer correct to two decimal places.

8. A and B are fixed points 2 in. apart. A point P moves so that the angle APB is constant and equal to  $60^\circ$ .

(a) What is the locus of P? No proof is required.

(b) Make an accurate drawing of the locus of P. A protractor or a set square may be used.

(c) The point Q is found by producing AP to Q so that  $PQ = PB$ . What is the locus of Q? No proof is required.

9. A triangle ABC has  $BC = 12$  cm. The line DE, parallel to BC, meets AB in D and AC in E. Also  $DE = 3$  cm. and  $BD = 12$  cm. Calculate AD.

Express the following areas as fractions of the area of the triangle ABC :—

- (a) triangle ADE ;
- (b) trapezium BCED ;
- (c) triangle BDE.

10. From the vertices B, C, of a triangle ABC, perpendiculars BY, CZ are drawn to the opposite sides meeting these sides in Y, Z respectively and meeting each other in O. Name two cyclic quadrilaterals in the figure.

Prove that the line joining the mid-point of AO to the mid-point of BC bisects YZ at right angles.

### FOR GIRLS ONLY

*Girls may substitute either one or both of the following questions for any of the Questions 1 to 10 above. They will only receive credit for answering ten questions but may answer any ten of the twelve questions on the paper.*

*Boys will receive no credit for answering either of the following questions.*

11. The triangle ABC is right-angled at A. On BC and AC the squares BDEC and ACFG are drawn, outside the triangle. Prove that :—

- (a) triangles BCF, ACE are congruent ;
- (b) AE is perpendicular to BF.

12. (a) Draw a circle of radius  $1\frac{1}{2}$  in. touching externally a circle of radius 2 in. Then draw a circle of radius 1 in. touching each of the others externally. Give a *brief* description of how the centre of the third circle was found.

(b) A semi-circle of radius 4 in. has centre O and diameter AOB. Two arcs, each of radius 4 in., are drawn with centres A and B to cut the semi-circle in C and D and to pass through O. A small circle is drawn to touch the semi-circle internally and the arcs OC, OD externally. Calculate the radius of the small circle.

MINISTRY OF EDUCATION FOR  
NORTHERN IRELAND

GRAMMAR SCHOOL CERTIFICATE  
EXAMINATIONS, 1951

JUNIOR

EXPERIMENTAL SCIENCE

Time allowed—2½ hours

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*SIX questions should be answered. Not more than FOUR of these should be chosen from either Section A or Section B.*

*Importance will be attached to accurate diagrams of the apparatus employed. These need be drawn only where indicated in the wording of the question.*

*All questions carry equal marks.*

SECTION A

1. (a) How, if at all, does the time of swing of a simple pendulum vary with (i) the weight of the bob ; (ii) the length of the pendulum ; (iii) the amplitude of the swing (provided this is not too great) ?

(b) Describe, with full experimental details, how you would verify any one of the statements you make.

(c) A simple pendulum took 101 seconds for 50 complete swings. How long would it take for 50 complete swings if its length was reduced to one quarter of the original value ?

2. (a) Distinguish between the " density " and the " relative density (or specific gravity) " of a substance.

(b) Describe, with the aid of a sketch, how you could make a simple instrument to measure densities of liquids directly.



(c) A common hydrometer has a mark A on the stem 15 cm. from the top, and another mark B 5 cm. from the top. When immersed in water, the hydrometer sinks to level A and when immersed in alcohol of S.G. (R.D.) 0.8 it sinks to level B. The hydrometer weighs 40 gm. in air.

- (i) What is the volume of the hydrometer up to mark A?
- (ii) What is the volume of the hydrometer up to mark B?
- (iii) What is the volume of the stem per cm. length?
- (iv) What is the R.D. of the liquid in which the hydrometer just sinks completely?

3. (a) Make one statement about the variation of pressure with depth in water, and another statement about the pressure at a *given* depth in water.

(b) How would you demonstrate the truth of *one* of your statements? Where appropriate, draw a sketch of the apparatus used.

(c) Explain briefly, with a diagram, the working of *one* of the following: an Artesian well, a hydraulic lift, a hydraulic press, a force pump.

4. Suggest *scientific* reasons for the following facts:—

- (a) It is easier to carry bricks in a wheelbarrow than to move them by hand.
- (b) Dogs often run about with their tongues out in hot weather.
- (c) If a kettle of water and an iron poker of the same weight are placed on a fire together, the poker gets hot much more quickly.
- (d) Unprotected water pipes often burst during a severe frost.
- (e) A spring balance will register different weights for the same object at the equator and near the north pole.

5. (a) What is meant by the statement that “the coefficient of linear expansion of copper is 0.000017 per degree C”?

(b) By how many inches does the length of an iron bridge,  $\frac{1}{2}$  mile long, vary during the year, assuming the lowest winter temperature is  $-4^{\circ}\text{C}$ . and the highest summer temperature is  $30^{\circ}\text{C}$ .? Give the answer to the nearest inch. (Coefficient of linear expansion of iron = 0.000012 per degree C.)

(c) A bi-metal strip was made by riveting together strips of iron and copper. Describe and explain what would happen if the strip was heated. Name *one* application of the bi-metal strip in a device in common use, and briefly explain its action.

6. (a) State the chief method by which heat is transferred (i) from the sun to the earth ; (ii) from your hand when placed on an iron railing ; (iii) from the boiler of a domestic hot water system to the hot water tank.

(b) Briefly describe *one* experiment to show that a polished metal or white surface is a poor absorber of heat, and *one* experiment to show that such a surface is a poor radiator of heat. Where appropriate, draw sketches of apparatus used.

(c) How far do these two properties of polished surfaces determine the efficiency of a vacuum flask when used for keeping tea hot ?

#### SECTION B

7. (a) Copy out and complete the table below, showing (i) the changes observed when sulphur, magnesium and carbon are heated strongly in air ; (ii) the main products left ; (iii) the action of each product on litmus solution.

Element.	(i) Observations.	(ii) Name of main product.	(iii) Acid, neutral or alkaline.
Sulphur ..			
Magnesium ..			
Carbon ..			

(b) " The rusting of iron is a process in which both oxygen and water are necessary." Describe how you would check this statement by experiment.

(c) Mention *two* practical methods used for preventing iron from rusting, and state why each method is effective.

[OVER

8. (a) Describe carefully, with the aid of a sketch of the apparatus used, an experiment you could perform to prepare nitric acid.

(b) How would you prepare from your sample some crystals of *either* potassium nitrate *or* lead nitrate ?

(c) Give *two* industrial uses of nitric acid.

9. Explain the following facts :—

(a) Hydrogen chloride (hydrochloric acid gas) forms dense white fumes with ammonia.

(b) When molten sulphur is poured into cold water, a dark amber substance remains which stretches like indiarubber. After a while, this new product becomes a hard, yellow solid.

(c) Sodium is stored under oil.

(d) On heating blue copper sulphate crystals they form a white powder which slowly becomes blue again when left in the open.

(e) Samples of copper carbonate and copper nitrate were heated to constant weight in separate crucibles. In each case a black powder was formed. It was found by analysis that the two black powders had the same composition.

10. (a) By means of a well-labelled sketch only, show how you would obtain a stream of *dry* hydrogen in the laboratory.

(b) Describe how you could use this hydrogen supply to show that the composition of water *by weight* is 1 part of hydrogen to 8 parts of oxygen. Give details of the precautions taken to ensure reasonable accuracy, and indicate how you would calculate the result.

11. (a) Describe *two* experiments which you would carry out in order to distinguish specimens of chalk, quicklime and slaked lime.

(b) Explain how you would prepare a specimen of calcium carbonate from calcium oxide.

(c) Briefly explain the means whereby the percentage of carbon dioxide in the atmosphere remains approximately constant.

12. (a) Tabulate the names of the following materials and indicate whether they are elements (E), compounds (C) or mixtures (M) by placing the appropriate letter after each name.

Air.	Nitre.
Sulphur.	Water.
Coal gas.	Coal tar.
Hydrogen.	Ammonia.

(b) Give *two* important differences between physical change and chemical change. Quote *two* examples of *each* type of change.

(c) 50.5 gm. of a mixture of sand, salt and ammonium chloride (sal ammoniac) were heated and the residue weighed. After reheating the weight was found to be constant at 40.4 gm. The mixture was then thoroughly washed with water and the remaining solid when dry weighed 21.2 gm. Calculate the percentage by weight of each substance in the mixture.

MINISTRY OF EDUCATION FOR  
NORTHERN IRELAND

GRAMMAR SCHOOL CERTIFICATE  
EXAMINATIONS, 1951

JUNIOR

DOMESTIC SCIENCE

Time allowed—2½ hours

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SIX questions should be answered. FIVE of these should be chosen from Section A, and ONE from Section B.

ALL questions carry equal marks.

All answers should be arranged under headings, or, when appropriate, in tabular form.

SECTION A

FIVE questions should be chosen from this Section.

1. Show in tabular form the food constituents which are necessary for the daily upkeep of the body and explain clearly their purpose. Give one food example for each.

2. (a) What is the definition of steaming?

(b) What are the general rules to be observed?

(c) Name *three* different methods of steaming, giving one example of each.

(d) Give the foundation recipe (ingredients only) for suet puddings, and give *three* suggestions for varying the recipe.

3. The larder is low in stores, but there are scraps of meat, 2 oz. margarine and 1 oz. sugar. You are allowed any unrationed foods, but must produce a cooked meal for a family of two adults and two young children at tea-time. State the cooked meal you would choose, and draw up a plan of work showing the order in which you would prepare the dishes.



4. (a) Name the cereals most commonly used for food.
- (b) Name *four* purposes for which cereals are used in the preparation of food.
- (c) Mention *one* dish to illustrate your answer, and give in detail the method of making.

5. Why are herrings considered such excellent food? Give directions for their preparation and two recipes for cooking and serving them.

6. You have been working alone in the kitchen at home and your dress has caught fire. What First Aid treatment would you give yourself?

You find your thigh is badly burnt at the front. How would you treat the burn?

7. You have moved into a house where the kitchen sink, wooden surround and waste pipe have been badly neglected. What steps would you take to bring these back to a proper usable condition?

8. Give directions for cleaning the following :—

- (a) A stained silver egg-spoon.
- (b) A metal tea-pot with tannin stain.
- (c) An enamel saucepan which has been badly burnt.
- (d) A greasy aluminium frying pan.

## SECTION B

*ONE question should be answered from this Section.*

9. What are the uses of a "facing" in needlework?

Give clear working directions for cutting and applying facings.

10. How would you repair any *two* of the following :—

- (a) A hole in the elbow of your school blouse ;
- (b) a worn place in a sheet ;
- (c) a hole in a knitted glove ?

MINISTRY OF EDUCATION FOR  
NORTHERN IRELAND

GRAMMAR SCHOOL CERTIFICATE  
EXAMINATIONS, 1951

JUNIOR

OBJECT, MEMORY, AND  
PICTORIAL DRAWING

Time allowed—2½ hours

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CONFIDENTIAL INSTRUCTIONS  
TO SUPERINTENDENTS

To be opened on the morning of  
FRIDAY, 22ND JUNE

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A teacher—preferably an Art teacher—should be asked to assist in making the preliminary arrangements of the examination, but he must leave the examination hall before the examination begins.

*The drawings on this sheet must not be shown to anyone except the teacher referred to above and then only when the group of objects is being arranged directly before the examination begins.*

## OBJECTS REQUIRED

Prior to the examination, Superintendents are required to assure themselves that one set of objects specified and a model are readily available for each group of 20, or less, candidates. Arrangements should be made to have the objects in the examination hall half an hour before the time fixed for the examination to begin.

*N.B.*

*To avoid unnecessary expense, Superintendents should arrange to borrow or hire, rather than purchase, the articles required for this examination.*

The undermentioned articles are required for each group of 20, or less, candidates attending the examination :

1. A boy or girl to act as model for the first 10 minutes of the examination, wearing a pull-over or jersey, and shorts or short skirt or Gym tunic, stockings and boots or shoes.
2. A wooden box or a half-size biscuit tin about 5 by 9 by 9 inches or longer.
3. A drawing board 23 by 16 inches.
4. Kitchen spring weighing-machine. If this is *unobtainable* balance scales may be used instead.
5. An earthenware bowl about 9 inches in diameter.
6. An empty carton such as cereals are packed in—in good condition, size about  $2\frac{1}{2}$  by  $5\frac{1}{2}$  by 8 inches.
7. Nine round biscuits.
8. A teacloth or thin glasscloth with a coloured border.
9. A large wooden spoon.

### ARRANGEMENT OF DESKS

Half an hour before the examination begins, the candidates' desks are to be arranged in semi-circular formation around the objects at a distance of not less than 10 feet and not more than 20 feet from the group.

Where space is limited, or where, for other reasons, it is impracticable to provide accommodation for all candidates in semi-circular formation around the objects, desks may be arranged in circular formation.

### ARRANGEMENT OF OBJECTS

Place the board horizontally not less than 18 inches and not more than 24 inches above the floor level.

Place the weighing-machine and the carton on the board at the angles to the back edge of the board shown in fig. 2, the top flap of the carton lying flat on the board. Place the bowl with the spoon in it at the angle shown, on the top of the weighing-machine.

The teacloth should be folded in four and then twisted loosely and laid across the carton not covering any corner of the carton. The biscuits should be placed as shown, five of them flat on the board.

### POSING THE MODEL

The model should try the pose a few minutes before the candidates enter the examination hall. He should stand facing the middle of the semi-circle of candidates' desks holding the box or tin with his right arm and resting it on his right hip. His left knee should be slightly bent and his right shoulder higher than his left shoulder.

Make sure that he is comfortable and can keep the pose, mark the places of his feet on the floor, and let him rest till the examination begins. Ten minutes after the examination begins he should leave the room.

OVER

## PROCEDURE OF THE EXAMINATION

Shortly before the time fixed for the examination, place a copy of the question paper, four sheets of drawing paper, each bearing the Centre number clearly stamped, and one envelope on each candidate's desk.

Immediately before the examination begins make the following announcement :—

“ The examination consists of four sections :

1. Drawing from life.
2. Pictorial drawing.
3. Object drawing.
4. Memory drawing.

For each of these sections you must use a separate sheet of drawing paper, and you must put your examination number at the top right-hand corner of each sheet. Your drawing should be on the same side of the paper as your number. If you propose to use water-colours for Pictorial Drawing, do your painting early in the examination so that it may have time to dry before you put it in the envelope.”

The model should then take the arranged pose for 10 minutes.

At 5 p.m. instruct the candidates to place their drawings in the envelopes, which they should then close.

*Note :*

A candidate requiring more than four sheets of drawing paper may have more issued to him, but all paper issued to any candidate must be returned in his envelope.

Each sheet issued must be *clearly stamped with the Centre number.*



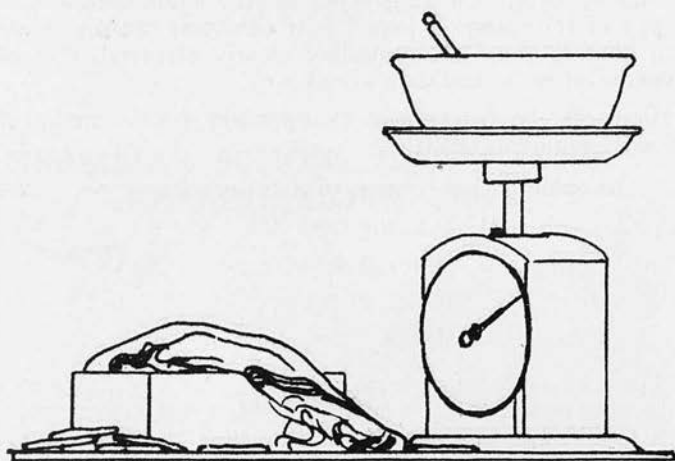


Fig. 1

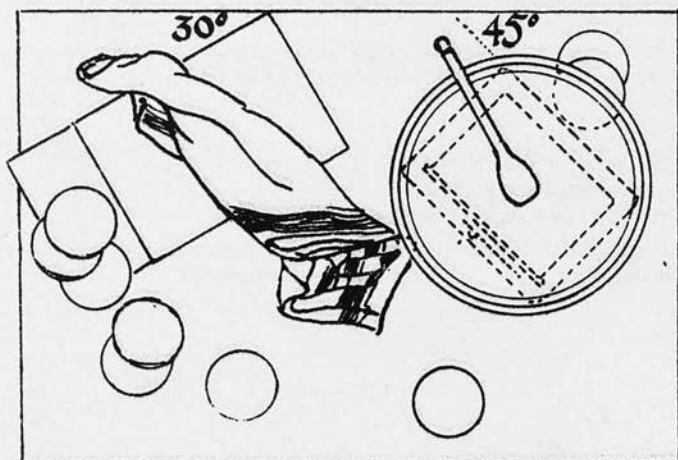


Fig. 2

MINISTRY OF EDUCATION FOR  
NORTHERN IRELAND

GRAMMAR SCHOOL CERTIFICATE  
EXAMINATIONS, 1951

JUNIOR

OBJECT, MEMORY, AND  
PICTORIAL DRAWING

Time allowed— $2\frac{1}{2}$  hours

*The examination comprises four tests, to be drawn on separate sheets of paper and enclosed in one envelope. Candidates must complete all four tests, but are permitted to use their discretion as to the proportion of time allotted to each.*

### 1. DRAWING FROM LIFE

(Suggested time—about 15 minutes)

(The model is posed for 10 minutes only)

Make a drawing of the person posing for you. (40 marks)

### 2. PICTORIAL DRAWING

(Suggested time—about 65 minutes)

Draw a clear line parallel to the right-hand side of your paper and  $2\frac{1}{2}$  inches from that side. Use the space to the left of this line for your picture. Make a picture, which must contain human figures or animals of which one at least measures over 4 inches in height, to illustrate *one* of the following subjects :—

(a) " Good-bye."

(b) Playing with toy trains.

(c) Rounders or cricket or netball.

(d) Carol-singers.

(e) Scene from a Christmas Carol. (70 marks)

### 3. OBJECT DRAWING

(Suggested time—about 50 minutes)

Make a drawing of the drawing-board and the group of objects on it. (60 marks)

### 4. MEMORY DRAWING

(Suggested time—about 20 minutes)

Make a drawing from memory of *one* of the following :—

(a) A bicycle lamp.

(b) A garden rake or a wooden hay rake.

(c) An alarm clock.

(d) A glass jug and a tumbler, both half full of milk, and both on a small tray.

(e) A rowing boat. (30 marks)

MINISTRY OF EDUCATION FOR  
NORTHERN IRELAND

GRAMMAR SCHOOL CERTIFICATE  
EXAMINATIONS, 1951

JUNIOR

GEOMETRICAL DRAWING  
AND DESIGN

Time allowed— $2\frac{1}{2}$  hours.

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FOUR questions should be answered. ONE of these should be chosen from Section A, ONE from Section B, ONE from Section C, and the remaining question from any part of the paper.

Separate sheets of drawing paper should be used for each Section, and all sheets issued should be placed in the single envelope provided, at the end of the examination.

The use of mathematical instruments, protractors, scales, tee and set squares, and drawing boards is allowed.

No credit will be given for solutions to questions in Geometrical Drawing, in which construction lines are not clearly and neatly shown.

The number of the question must be distinctly marked by the side of each drawing.

ALL questions carry equal marks.

## SECTION A

## PLANE GEOMETRY

1. The line AB (Fig. 1) represents a distance of 39 inches on a scale. Draw the scale to measure up to 5 feet.

2. Within an equilateral triangle with sides 5 inches in length, inscribe four circles (Fig. 2). The large circle is to touch the three sides of the triangle and the three smaller circles are to touch each other and two sides of the given triangle.

## SOLID GEOMETRY

3. The front elevation is shown of two matchboxes (Fig. 3), one resting at an angle of  $30^\circ$  and in the middle of the other. Copy the front elevation to the given dimensions and produce the plan.

4. The plan and elevation is shown of three golf balls, one resting upon the other two (Fig. 4). Draw (i) the plan and elevation, and (ii) a new elevation when the axis (AB) makes an angle of  $30^\circ$  with the vertical plane.

## SECTION B

## GEOMETRICALLY CONSTRUCTED PATTERN

5. Fig. 5 shows the setting out of a repeating pattern upon a square network and turning round. Within an 8-inch square set out the pattern.

6. Set out the all-over pattern shown in Fig. 6 upon a diamond network of  $60^\circ$  and with the sides of the diamonds  $2\frac{1}{2}$  inches in length. Complete four repeats; you may colour your finished pattern.

7. Make a copy of the interlacing ornament shown in Fig. 7. The drawing should be left in pencil to show the accuracy of your working and the interlacing of the ornament. All the bands are  $\frac{3}{8}$ -inch wide.

8. Fig. 8 shows the setting out of a wrought-iron grill upon a network of  $\frac{1}{4}$ -inch squares. Copy this to the given dimensions.



A ————— B

FIG.1.

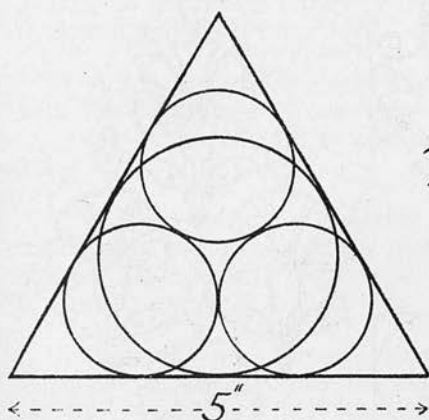


FIG.2

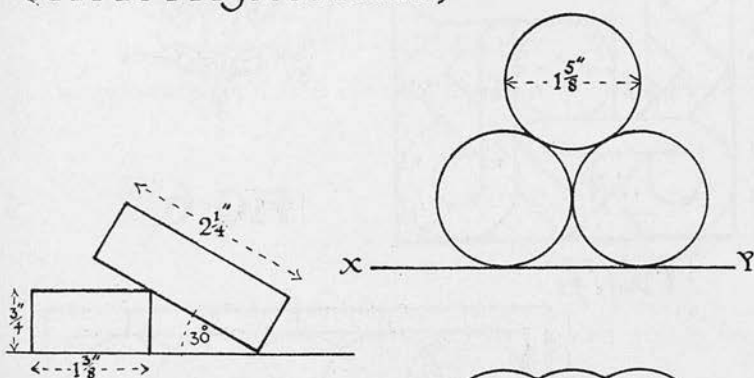


FIG.3.

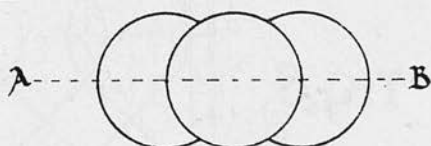
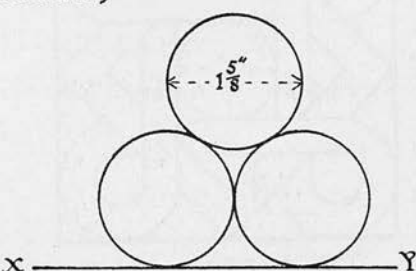


FIG.4.

[OVER



FIG. 5.

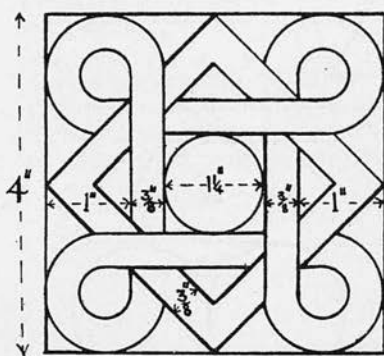


FIG. 7.

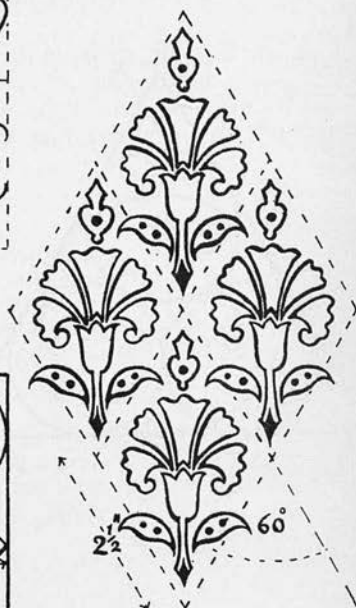
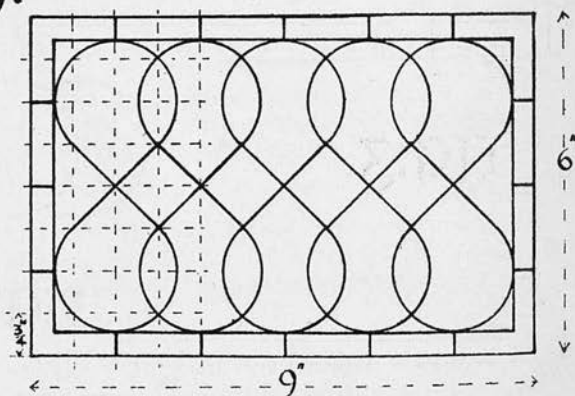


FIG. 6.

FIG. 8.



## SECTION C

## DESIGN

9. Make a design for one page of a child's book of the alphabet, the size of the page to be 7 inches by 5 inches. The design is to consist of a large capital letter and a figure or object relating to the chosen letter. The design should be simple in treatment and colourful.

10. A flat fruit dish, 9 inches in diameter, is to be decorated with free-brushwork. Your design may take the form of a repeating border pattern or a single motif filling the circular dish.

11. Draw a rectangle  $7\frac{1}{2}$  inches high and 6 inches wide. Inside this rectangle make a net of  $60^\circ$  diamonds, each diamond measuring  $1\frac{1}{2}$  inches high. Use this net of diamonds to design a counterchange pattern.

12. Make a design for one sheet or page of a day-to-day calendar. It should include the following well-drawn lettering (preferably in Roman or Block capitals) :—

A P R I L—TUESDAY 5.

The numeral should form the chief feature of your design.

MINISTRY OF EDUCATION FOR  
NORTHERN IRELAND

GRAMMAR SCHOOL CERTIFICATE  
EXAMINATIONS, 1951

JUNIOR  
MUSIC

Time allowed—2½ hours

*ALL questions should be answered.*

*Question 1 carries more marks than the other questions.*

*All answers must be IN INK.*

1. The following is the opening of the slow movement of a pianoforte sonata by Mozart :—

*Adagio*

The musical score is for the opening of the slow movement of a pianoforte sonata by Mozart. It is written in G major (one sharp) and 3/4 time. The tempo is marked 'Adagio'. The score consists of three systems of staves. The first system has a treble staff with a melodic line starting on G4, marked 'sp' (pianissimo), and a bass staff with a supporting line. The second system continues the melody with a repeat sign and a fermata, and the bass staff has a more active line. The third system shows the melody continuing and then ending with a fermata, while the bass staff has a final cadence.

- (a) In what key is it ?
- (b) What should be its time signature ?
- (c) What do you understand by *fp* ?
- (d) How should you play the quavers in the left-hand part in the second bar ?
- (e) What is the name of the ornament in bars 1 and 5, and what do you understand by it ?
- (f) What is the interval between the third and fourth notes in the right-hand part in (i) bar 2 and (ii) bar 6, and (iii) that between the two left-hand notes on the last quaver of bar 6 ?

(40 marks)

2. In the above quotation :—

- (a) Transpose the right-hand part of bar 3 up a semi-tone, using the appropriate key signature and any other necessary accidentals.
- (b) Write the left-hand part of bar 5 in the treble clef, leaving the notes at the same pitch.

(30 marks)

3. Identify all the tonic triads in the given example, stating in each case the number of the bar and the beat on which it occurs. State whether each triad is in root position, or first or second inversion.

(30 marks)

4. Give the meanings of *five* of these terms :—

Lento ; Vivace ; Cantabile ; Morendo ; Dolcissimo ;  
Pizzicato ; Con fuoco.

(30 marks)

5. Answer *one* of the following :—

- (a) Describe some of the differences between Purcell's music and that of the Elizabethans.
- (b) Describe the characteristics of the Madrigal, the Ballet (sung, not danced) and the Lute-song, quoting any examples you know of each type.
- (c) Write a short essay on "Oratorio, to the end of the seventeenth century."
- (d) Write short notes on the following :—  
Recitative ; Masque ; Viol ; Canon.

(30 marks)



APPENDIX D.

Senior Certificate Examination Papers, 1953.

MINISTRY OF EDUCATION FOR  
NORTHERN IRELAND

GRAMMAR SCHOOL CERTIFICATE  
EXAMINATIONS, 1953

SENIOR  
ENGLISH LANGUAGE  
(ORDINARY)

Time allowed—3 hours

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*ALL questions should be answered.*

SECTION I

COMPOSITION

*[Candidates are advised to spend approximately one-half of their time on this Section of the paper.]*

1. Select *one* of the following subjects (a) to (i) :—
- (a) The coastline of Northern Ireland.
  - (b) Christian names.
  - (c) On keeping cool.
  - (d) "A man ought to read just as inclination leads him for what he reads as a task will do him little good."
  - (e) Discuss equality of opportunity for men and women in the professions. Is such equality practicable or desirable?
  - (f) "All the fun of the fair." A description of a fairground in a country town or at the seaside.
  - (g) A lament for tramcars.
  - (h) Describe a small Ulster town or village with which you are familiar. Your description should include references to the town's situation, inhabitants, history, and prospects.

- (i) Describe some of the ways in which the application of modern scientific discoveries has altered the nature or widened the scope of public and private entertainments and pastimes. (220 marks)

## SECTION II

### INTERPRETATION AND COMMAND OF ENGLISH

2. Read the following passage and then answer all the questions which follow it :—

Harley's influence in Parliament was indeed altogether out of proportion to his abilities. His intellect was both small and slow. He was unable to take a large view of any subject. He never acquired the art of expressing himself in public with  
 5 **fluency and perspicuity**. He had none of the external graces of an orator, yet he was heard with respect. For, such as his mind was, it had been assiduously cultivated. His youth had been studious, and to the last he continued to love books and the society of men of genius and learning. He had that  
 10 sort of industry which would have made him a **respectable antiquary** or a King-at-Arms. His taste led him to plod among old records ; and, in that age, it was only by plodding among old records that any man could obtain an accurate and extensive knowledge of the law of Parliament. Having  
 15 few rivals in this laborious and unattractive pursuit, he soon began to be regarded as **an oracle on questions of form and privilege**. His moral character added not a little to his influence. He had indeed great vices ; but they were not of a scandalous nature. He was not to be corrupted by money. His private  
 20 life was regular. His knowledge, his gravity, and his independent position gained for him the ear of the House. [Even his bad speaking was, in some sense, an advantage to him. For people are very loth to admit that the same man can unite very different kinds of excellence. It is soothing to  
 25 envy to believe that what is splendid cannot be solid, that what is clear cannot be profound. Very slowly was the public brought to acknowledge that Mansfield was a great jurist ; and that Burke was a great master of political science. Montague was a brilliant rhetorician, and, therefore, though  
 30 he had ten times Harley's capacity for the driest parts of business, was represented by detractors as a superficial, prating, pretender. But, from the absence of show in Harley's discourses, many people inferred that there must be much substance ; and he was pronounced to be a deep read, deep  
 35 thinking gentleman, not a fine talker, but fitter to direct affairs of state than all the fine talkers in the world.] This character he long supported with that cunning which is

frequently found in company with **ambitious and unquiet mediocrity**. He constantly had, even with his best friends, an  
 40 air of mystery and reserve which seemed to indicate that he knew some momentous secret, and that his mind was labouring with some vast design. In this way he got and long kept a high reputation for wisdom. It was not till that reputation had made him an Earl, a Knight of the Garter, Lord High  
 45 Treasurer of England, and master of the fate of Europe, that his admirers began to find out that he was really a dull puzzleheaded man.

- (a) Basing your answer on the passage, state in your own words the qualities in Harley's character that were worthy and admirable.
- (b) In a similar way show how he was lacking in the qualities necessary in a great statesman.
- (c) Why did he exercise so great an influence on his contemporaries?
- (d) Using your own words, make a summary, approximately 50 words in length, of that section of the passage which has been enclosed in brackets.
- (e) Give in your own words the meaning of the phrases which have been printed in heavy type.
- (f) Give for each of the following words a word of similar meaning which might be used to replace it in the passage: assiduously (line 7); gravity (line 20); pronounced (line 34); character (line 37); reserve (line 40); momentous (line 41).
- (g) Make a general clause analysis of the sentence which begins with the words: "It was not till that reputation" (line 43), and ends with the words: "a dull puzzleheaded man."

(150 marks)

3. Define and exemplify: Colloquialism, Dialect, Jargon, Slang. When dealing with each in turn state in what circumstances you consider its use desirable, permissible or excusable.

(30 marks)

MINISTRY OF EDUCATION FOR  
NORTHERN IRELAND

GRAMMAR SCHOOL CERTIFICATE  
EXAMINATIONS, 1953

SENIOR

ENGLISH LITERATURE  
(ORDINARY)

Time allowed—3 hours

---

ALL SIX questions should be answered.

1. Answer *one* of the following :—

(a) *As You Like It*, it has been said, is “ a comprehensive study in feminine temperament.” Develop this statement in some detail. In what ways do the women characters severally contribute to the spirit of the play ?

(b) Describe, giving short quotations, the first meeting between Jaques and the banished Duke (Jaques’s first words are “ A fool, a fool, I met a fool i’ the forest ”) ; and quote accurately the speech on the seven ages of man. What light does the scene throw on Jaques’s character ?

(c) Introducing brief quotations, indicate the sequence of events in the last scene of *As You Like It*. Comment in detail on the style and dramatic spirit of the scene.

(70 marks)

2. Answer *one* of the following :—

(a) “ In *King Lear* an aged man is put to school.”

Give an account of the lessons which the King learns in the course of the action, and of the circumstances in which he learns them. Illustrate freely with quotations and pointed references.

(b) Show close acquaintance with the “ reconciliation scene ” between Cordelia and Lear, and indicate its dramatic and poetic effectiveness.

(c) “ In Goneril and Regan we see a gradual process of degeneration : they are women who ‘ turn monsters ’.”

Consider this question with reference to Goneril alone, passing in review the scenes in which she appears.

(70 marks)



3. Answer *one* of the following :—

(a) Dr. Johnson said of *L'Allegro* and *Il Penseroso* that "every man that reads them, reads them with pleasure." Do you? If so, attempt to show it by quoting your favourite passages and considering what it is about them that gives you pleasure. If not, name *two* other poems of similar length which you do enjoy (giving authors and approximate dates); and, quoting freely, review them in such a way as to show that you have derived genuine pleasure from them.

(b) Which nineteenth-century poet have you most enjoyed? Show your general appreciation of his work, indicating his characteristic themes, moods, and styles, and singling out *one* of his longer poems for special attention.

[N.B.—Choose a poet who died in the nineteenth century.]

(c) Name the authors of the following :—

*The Hound of Heaven, O What is that Sound, The Hollow Men, The Fish, The Host of the Air.*

Select *two* of these poems; show that you understand the poet's mood and intention in writing them; and review their detail, pointing out thoughts and expressions which you have especially admired.

(100 marks)

4. EITHER answer *one* of the following :—

(a) Examine *two* of Bacon's essays closely with the object of illustrating the qualities of his prose style and his way of ordering and presenting his ideas.

(b) Referring to a variety of Lamb's essays, say what you have gleaned from them regarding his character and tastes.

(c) Set forth, in such detail as the prescribed course permits, Chesterton's philosophy of life; and discuss with suitable illustration his manner of imparting it.

OR answer *one* of the following :—

(d) Show your detailed acquaintance with Kinglake's chapter on "Cairo and the Plague." What characteristics of his style and attitude does it display?

(e) Write a short essay, illustrated from various parts of his book, on Kinglake's humour.

(f) Discuss *Eothen* in some detail as "a mirror of Kinglake's partialities and antipathies." How do his prejudices affect your enjoyment of his writing?

(60 marks)



5. EITHER answer *one* of the following :—

(a) Which character in *She Stoops to Conquer* would you most like to be able to perform on the stage? Study the part in detail and show what difficulties and opportunities it presents to the actor who undertakes it.

(b) "The first Act of *She Stoops to Conquer* provides the audience with all the facts upon which the action will turn, and excuses in advance every improbability which follows."

Study the Act to show what facts it provides and what excuses it suggests; and indicate their relevance to the remaining action of the play.

(c) In which scenes of *She Stoops to Conquer* have you found the dialogue most memorable? Indicate—by quotation, pointed reference, and critical comment—the qualities of the dialogue in these scenes.

OR answer *one* of the following :—

(d) Name the stories which end with the following passages:—

(i) "This will enable us to live in comfort, if not in affluence, and the rest of your engaging days can be peacefully spent in flying kites."

(ii) Landlord's field wasn't a penny the worse for the visit, but they do say that since then the turnips that have been grown in it have tasted of rum.

(iii) The door of Hans' first cage now slid open again; it was finished, he could go. But Hans did not go.

(iv) "Here are the five sovereigns, and—once more—go in peace."

Consider the theme, style, and treatment of *two* of these stories, and indicate the relevance of their concluding words.

(e) Name the *three* prescribed short stories which you have most enjoyed. State very briefly the nature and substance of each, and the impression you have formed of it. Are there any features which they all possess in common, to which you can point and say, "These are the characteristics of this kind of fiction"?

(f) Spreading your survey over a wide field, illustrate the importance in the short story of the careful choice of "significant detail."

(40 marks)

[OVER

6. Answer *one* of the following :—

(a) From one prescribed novel select a scene intended to arouse pathos *or* excitement in the reader ; and from another prescribed novel select a scene intended to arouse a similar response. Comparing the two scenes, what general conclusions do you draw about the art and outlook of the two novelists ?

(b) Name the three prescribed novels you have read, and state approximately their dates of publication. Show what light each throws on its author's character, tastes, and sympathies, indicating which in your opinion is most revealing in this respect.

(c) Name the three prescribed novels you have read, and state approximately their dates of publication. Which of these presents the greatest variety of theme ? Discuss this novel, distinguishing the main and the subsidiary plots, and considering whether unity is maintained in spite of the crowded and varied scene.

(60 marks)

MINISTRY OF EDUCATION FOR  
NORTHERN IRELAND

GRAMMAR SCHOOL CERTIFICATE  
EXAMINATIONS, 1953

SENIOR

FRENCH (Ordinary)

Time allowed—3 hours

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*When answering Questions 1 (a) and 2, candidates must preserve the paragraphing of the original.*

## 1. COMPOSITION

(a) Translate into French :

"May I go out with you, father?" asked Paul one morning. "I don't know what to do." "Well, come if you like," answered Dr. Martin. "I am going to see Farmer Beauchamp; I received a letter to-day telling me his old servant is ill."

"Oh, you are going to the farm," exclaimed Mrs. Martin. "Can you take a basket, Paul, and bring back eggs and butter? ask Mrs. Beauchamp, too, if she has any vegetables: there weren't any at the market yesterday."

Paul and his father were soon ready and set off in the car. When they arrived, the doctor entered the farm-house and went upstairs to examine the patient. Mrs. Beauchamp took Paul to see the hens. "I'll try to find some eggs for you," she said.

A little later, Dr. Martin came out of the house and when he and Paul got into the car, they noticed that Mrs. Beauchamp had put a large box full of provisions on the seat. Of course, they were delighted and returned home as quickly as they could. (60 marks)

(b) Write, in French, an essay on *one* of the following subjects:—

(i) *Incident au jardin zoologique*

Jour de congé — visite au jardin zoologique — les animaux — arrêt devant la cage aux singes — jeu avec les singes — doigts mordus — hôpital.

(ii) Le jour le plus heureux de votre vie.

(iii) Ecrivez une lettre en réponse à un ami français qui vous a demandé de lui indiquer quelques livres anglais intéressants.

(iv) Une aventure curieuse qui vous est arrivée.

[N.B. The length of the essay should be about 150-200 words.] (60 marks)

## 2. TRANSLATION

Translate into English :

(a) *La clef de l'oncle*

L'oncle Cadignan habitait assez près de chez nous une petite ville où des amis me donnaient parfois l'hospitalité au temps des vacances. Il vivait là, seul, sans rien dépenser, dans une vieille maison toujours silencieuse. On le disait avare autant que riche. On parlait de trésors rapportés des Indes, et qu'il cachait. Mais si quelqu'un, pour plaisanter, faisait là-dessus quelque allusion, l'oncle Cadignan se mettait à rire, et tendant du côté de sa maison sa belle canne à pomme d'argent, il s'écriait : " Que les voleurs y aillent voir ; la clef est toujours sur la porte ! "

En effet, la clef, énorme et polie par l'usage, restait toujours sur la porte de l'oncle Cadignan. Il ne l'enlevait même pas la nuit ; tout le monde en passant pouvait la voir reluire les soirs de lune. Et, chose étrange, malgré l'invitation, les voleurs n'y étaient jamais allés voir. Ils pensaient : Quand la clef est dans la serrure, cela dénote qu'il n'y a pas grand'chose derrière. Chacun à la fin pensait comme les voleurs. On continuait à croire l'oncle Cadignan riche autant qu'avare, mais on supposait que, par prudence, il avait mis les trésors en sûreté, quelque part, hors du pays.

(b) *Un bon chien de berger*

Tout le monde connaît l'intelligence du chien de berger, nous en avons tous les jours des preuves en nous promenant dans la campagne ; mais je ne puis, cependant, résister au désir de vous citer un fait raconté par James Hogg. Sept cents agneaux, confiés à la garde d'un berger, s'échappèrent par une belle nuit d'été, se dispersant en plusieurs bandes, et s'enfuirent à travers les vallons, les plaines, les montagnes. " Sirrah, mon garçon, mes agneaux sont partis ! " dit douloureusement Hogg à son chien, exprimant sa pensée et ne songeant pas du tout à lui donner un ordre. Puis il se mit à courir partout à la recherche de ses agneaux.

Quant au chien, il avait disparu sans aboyer et sans être vu de son maître, car la nuit ne permettait pas de voir autour de soi. Lorsque le jour vint, le pauvre berger, accablé de fatigue, se disposait à retourner à la ferme, quand il aperçut, dans le fond d'une vallée, son fidèle chien Sirrah qui gardait, non pas quelques agneaux retrouvés, comme on aurait pu le croire d'abord, mais le troupeau tout entier. C'est, dit Hogg, le fait le plus surprenant qui me soit arrivé dans tout le cours de ma vie. Et, en effet, comment comprendre par quel travail et quelle patience ce chien réussit, dans le court espace d'une nuit, à réunir tous les fuyards !

(120 marks)

[OVER



MINISTRY OF EDUCATION FOR  
NORTHERN IRELAND

GRAMMAR SCHOOL CERTIFICATE  
EXAMINATIONS, 1953

SENIOR

MATHEMATICS (Alternative)

(ORDINARY)

(FIRST PAPER)

Time allowed—3 hours

(200 marks)

*ALL questions should be answered.*

*All questions carry equal marks.*

1. The rates of weekly contributions for employed persons under the National Insurance Act are :—

MEN				WOMEN		
Age	Paid by employee	Paid by employer	Total	Paid by employee	Paid by employer	Total
18 and over.	5s. 9d.	5s. 0d.	10s. 9d.	4s. 6d.	3s. 11d.	8s. 5d.
Under 18	3s. 5d.	3s. 0d.	6s. 5d.	2s. 9d.	2s. 4d.	5s. 1d.

Contributions are paid by means of stamps bought by the employer. A factory owner employs 18 men, 9 boys (under 18 years old), 9 women, and 2 girls (ages 16 and 17 years).

- What is the total weekly contribution of the employer?
- What is the weekly cost of all the stamps required?
- What percentage of the total weekly cost of the stamps is paid by the employees? Give your answer correct to one decimal place.



2. In 50 equal time intervals a cigarette machine produced the following numbers of unsatisfactory cigarettes :—

3, 4, 3, 1, 4, 3, 2, 5, 3, 4, 1, 6, 5, 3, 3, 4, 2, 3, 4, 1, 2, 3, 4, 5, 5, 4, 2, 5, 3, 4, 6, 2, 3, 2, 3, 4, 5, 4, 3, 5, 2, 1, 3, 2, 5, 4, 4, 3, 2, 2.

Make a frequency table showing the number of times 1, 2, 3, 4, 5, 6 unsatisfactory cigarettes were produced. Illustrate your results by a histogram.

3. From the table below construct a table showing corresponding values of  $x$  and  $\sqrt{y}$ , giving the latter to the nearest first place of decimals. Show graphically that  $x$  and  $y$  are connected by a law of the form  $\sqrt{y} = ax + b$ , where  $a$  and  $b$  are constants. From your graph find the values of  $a$  and  $b$ .

$x$	2	4	6	8	10	12
$y$	10	19	31	48	64	85

4. (a) Fig. 1 represents a wool mat, 3 feet by 1 foot. The inner rectangle is to be light brown in colour, and the border is to be dark brown and is to have a uniform width of  $x$  feet. Show that if the light brown and the dark brown parts are to be of equal area, then  $8x^2 - 16x + 3 = 0$ .

Find, correct to two decimal places, the value of  $x$ .

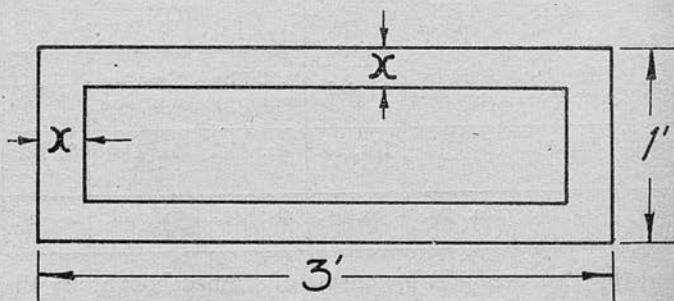


Fig. 1

(b) The equation  $y = ax^2 + bx + c$  where  $a$ ,  $b$  and  $c$  are constants, is satisfied when  $x = 1$  and  $y = 2$ , when  $x = 2$  and  $y = 12$ , and when  $x = 3$  and  $y = 28$ . Find the values of  $a$ ,  $b$ , and  $c$ .

Find, also, the values of  $x$  and  $y$  which satisfy this equation and also the equation  $y = 2x + 2$ .

5. (a) Using logarithms evaluate :—

$$\frac{44.86 \times \sqrt{0.8143}}{(9.023)^3}.$$

(b) If  $y = \log_2 x$ , find the values of  $y$  corresponding to  $x = 8, 4\sqrt{2}, 4, 2\sqrt{2}, 2, 1, \frac{1}{2}, \frac{1}{4}$ , and draw the graph of  $\log_2 x$ .

6. (a) Find, from first principles, the differential coefficient of  $y = x^2 - 2x + 5$ .

(b) Without working from first principles differentiate the following expressions with respect to  $x$  :—

(i)  $4x^5 - 7x^3 + 2x^2 + 5x + 7$ .

(ii)  $\sqrt{9x^9} + \frac{4}{x} - \frac{2}{x^2}$ .

(c) Find the gradient of the tangent to the curve  $y = 2x^2 - 3x + 5$  at the point on the curve where  $x = 2$ . What are the equations of the tangent and the normal to the curve at this point?

7. (a) Integrate with respect to  $x$  (after simplifying where necessary) the following functions :—

(i)  $\frac{1 - 2x^3 - 3x^5}{x^2}$ .

(ii)  $4\sqrt{x^3} + \frac{3}{\sqrt[3]{x}} - 5$ .

(b) Find by integration the area of that part of the curve  $y = -x^2 + 6x - 5$  which lies above the  $x$  axis.

[OVER

8. Fig. 2 shows a sketch of a container in the form of a square prism. The framework consists of 16 strips of light wood each of length  $x$  feet, and four pieces each of length  $l$  feet; the whole outside of the container is covered with fabric. The total length of wood strip used is 36 feet.

- Show that  $4x + l = 9$ .
- Show that the external volume of the container is  $9x^2 - 4x^3$ .
- Find the values of  $x$  and  $l$  so that this volume will be a maximum.
- Find the values of  $x$  and  $l$  so that the total external surface area of fabric is a maximum.

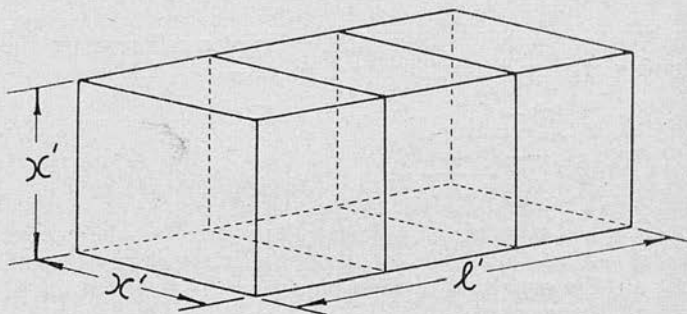


Fig. 2

MINISTRY OF EDUCATION FOR  
NORTHERN IRELAND

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EXAMINATIONS, 1953

SENIOR

MATHEMATICS (Alternative)

(ORDINARY)

(SECOND PAPER)

Time allowed—3 hours

(200 marks)

*ALL questions should be answered.*

*All questions carry equal marks.*

1. Fig. 1 shows the section of a railway cutting ABCD (not drawn to scale) having a horizontal base  $AB = 20$  feet;  $BC = 40$  feet and  $AD = 25$  feet. Calculate the lengths of the vertical lines  $CN$  and  $DM$ , and also the length of the footbridge  $DC$  which could span the cutting across the top. Also find the angle of inclination of  $DC$  with the horizontal line  $DR$ .

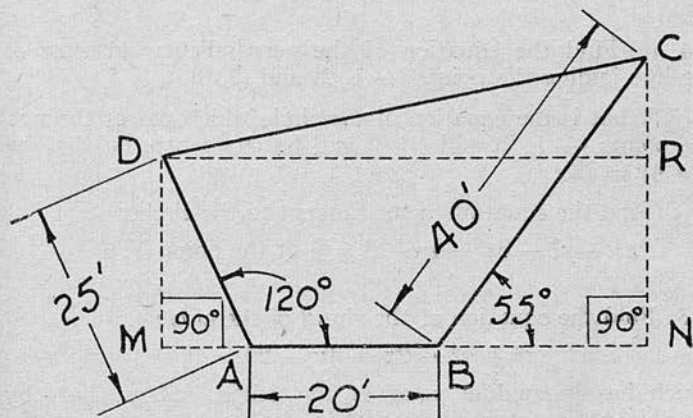


Fig. 1.

2. Fig. 2 is part of a broken wheel bounded by arcs of two concentric circles;  $CD = 36$  inches. The height of the inner segment is 12 inches and the height of the outer segment is 15 inches. Calculate:—

- the external diameter of the wheel;
- the external width  $AB$ .

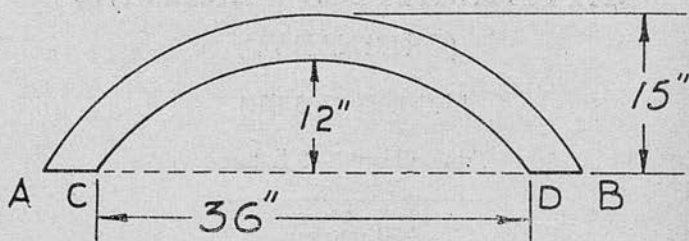


Fig. 2.

3. The coordinates of three points are  $A(4, 2)$ ,  $B(-4, -4)$ , and  $C(6, -2)$ . Obtain by calculation:—

- the length of  $AB$ ;
- the equation of  $AC$ ;
- the equation of the line through  $B$  parallel to  $AC$ ;
- the area of the triangle  $ABC$ .

4. (a) Find the equation of the perpendicular bisector of the line joining the points  $(-1, 2)$  and  $(1, 6)$ .

(b) What is the equation of the circle which passes through the points  $(-1, 2)$  and  $(1, 6)$  and has its centre on the line  $x + 4y = 12$ ?

(c) Find the equation of the tangent to the circle

$$x^2 + y^2 - 8x - 4y - 5 = 0 \text{ at the point } (1, 6).$$

5. Find the equation of the chord of the circle

$$x^2 + y^2 - 2x - 4y - 20 = 0,$$

which has its middle point at the origin. Show that, by suitable choice of radius, another circle with centre at the point  $(-1, -2)$  can be drawn so that the chord will be common to the two circles. Find the equation of this second circle.



6. Draw the graphs of  $y = \sin x$  and  $y = 2 \cos 2x$  for values of  $x$  from  $0^\circ$  to  $360^\circ$ , and find four solutions of the equation:  $\sin x = 2 \cos 2x$ .

7. Fig. 3 represents a cubical room of side 20 feet.

- Find the length of the diagonal HB.
- Find the angle which the diagonal HB makes with the base ABCD.
- If J is the mid-point of the side FG, by considering the triangle AJH, prove that the cosine of the angle AJH is  $\frac{1}{\sqrt{5}}$ .
- Find the angle which the plane HAB makes with the plane ABCD.

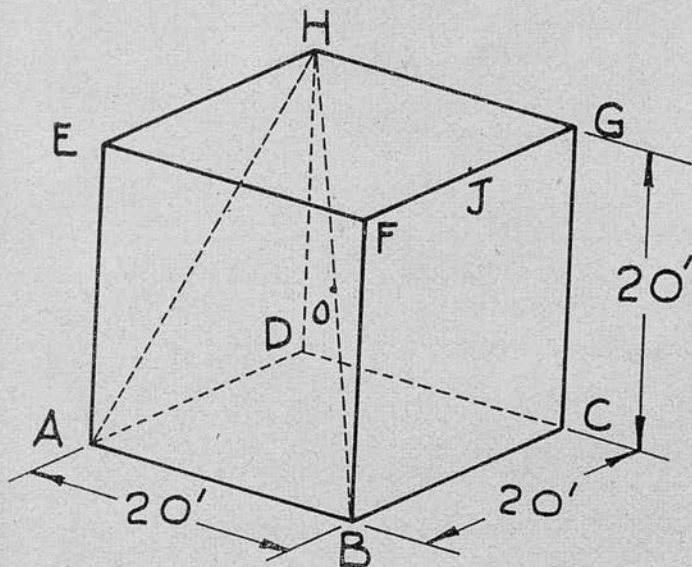


Fig. 3.

8. With reference to the cubical room shown in Fig. 3 state:—

- the locus of all points in the room 10 feet from the centre point O;
- the locus of all points in the room equidistant from the points A and B;
- the locus of all points in the room equidistant from the planes ABCD and ABFE;
- the locus of all points in the room equidistant from the planes ABCD, ABFE and ADHE.

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GRAMMAR SCHOOL CERTIFICATE  
EXAMINATIONS, 1953.

SENIOR

MATHEMATICS (Traditional)  
(ORDINARY)

(SECOND PAPER)

Time allowed—3 hours

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(200 marks)

*ALL questions should be answered.*

*All questions carry equal marks.*

1. (a) Find  $\cos 153^\circ 25'$  and  $\tan 1.4\pi$  radians.

(b) Find all the angles in the range  $-180^\circ$  to  $180^\circ$  which satisfy the equation  $\cos 2x = \sin x$ .

(c) The force  $P$  required to pull a weight  $W$  up an inclined plane is given by

$$P = W \left( \frac{0.978 \sin B + 0.208 \cos B}{\cos B} \right).$$

Find the value of  $B$  in degrees when  $W = 1,000$  and  $P = 507$ .

2. Fig. 1 shows the section of a railway cutting ABCD (not drawn to scale) having a horizontal base  $AB = 20$  feet;  $BC = 40$  feet and  $AD = 25$  feet. Calculate the lengths of the vertical lines  $CN$  and  $DM$ , and also the length of the foot-bridge  $DC$  which could span the cutting across the top. Also find the angle of inclination of  $DC$  with the horizontal line  $DR$ .

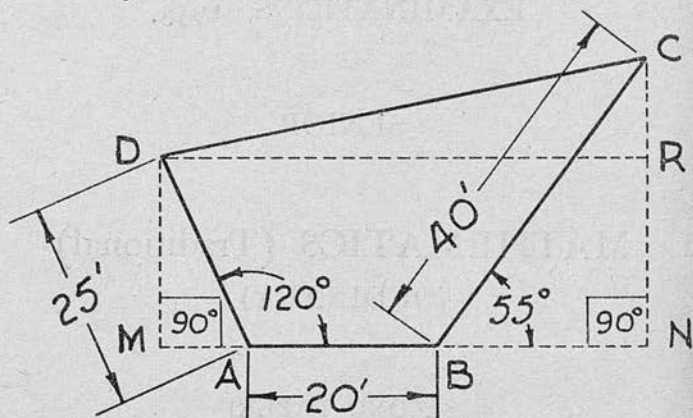


Fig. 1.

3. (a) Fig. 2 shows an irregular convex hexagon (not drawn to scale) in which the angles  $CDE$  and  $DEF$  are equal. Calculate these angles and also the angles  $CDA$ ,  $DAF$ , and  $DAB$ . In this hexagon name :—

- a quadrilateral which is cyclic ;
- a quadrilateral which is a trapezium.

State briefly your reasons.

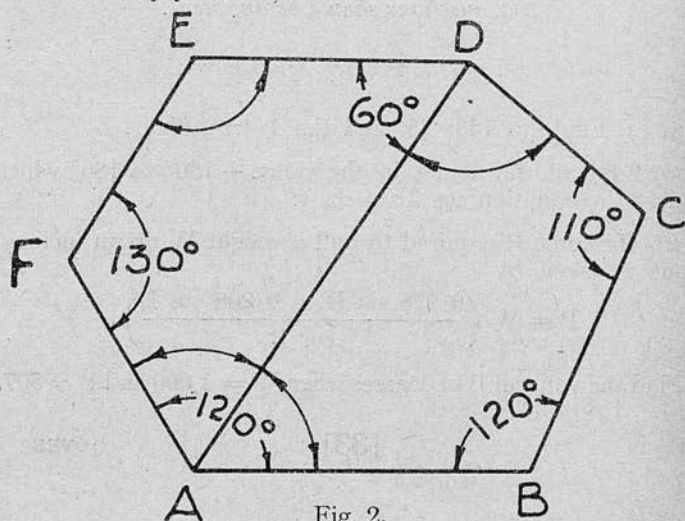


Fig. 2.

(b) Calculate the interior angle of a regular pentagon. ABCDE is a regular pentagon in which each side is  $a$  inches long, and each of the diagonals AC and AD is  $x$  inches long.

If  $\sin 18^\circ = \frac{\sqrt{5}-1}{4}$ , by considering triangle ADC,

$$\text{show that } x = \frac{a(\sqrt{5}+1)}{2}.$$

4. Fig. 3 is part of a broken wheel bounded by arcs of two concentric circles; CD = 36 inches. The height of the inner segment is 12 inches and the height of the outer segment is 15 inches. Calculate:—

- the external diameter of the wheel;
- the external width AB.

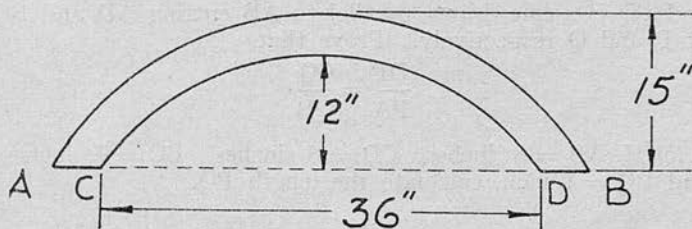


Fig. 3.

5. ABCD is a parallelogram. Points P and Q are taken in the sides AD and BC respectively so that

$$\frac{AP}{PD} = \frac{CQ}{QB}.$$

- Show that  $PD = QB$ .
- If PC and QD meet at R, show that

$$\frac{CR}{RP} = \frac{QR}{RD} = \frac{AP}{PD}.$$

6. AB is a fixed line of length 3 inches. State as precisely as possible (without formal proof) the locus of P in each of the following cases :—

(a) the angle APB is  $60^\circ$  ;

(b) the area of the triangle APB = 3 square inches ;

(c)  $AP^2 + BP^2 = 9$  square inches.

7. (a) Prove that the areas of similar triangles are proportional to the squares on corresponding sides.

(b) ABC is a triangle right-angled at B. Show, with proof, how to find a point P in CB produced such that

$$\frac{CB}{BP} = \frac{BC^2}{BA^2}.$$

8. (a) ABCD is a trapezium having AB parallel to DC, and PQ is a line drawn parallel to AB cutting AD and BC at P and Q respectively. Prove that

$$\frac{DP}{PA} = \frac{CQ}{QB}.$$

(b) If AB = 8 inches, CD = 6 inches, BC = 4 inches, and BQ = 1 inch, calculate the length PQ.



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EXAMINATIONS, 1953

SENIOR

MATHEMATICS (Traditional)  
(ORDINARY)

(FIRST PAPER)

Time allowed—3 hours

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(200 marks)

*ALL questions should be answered.*

*All questions carry equal marks.*

1. (a) A piece of antique furniture bought in January, 1913 for £18 was sold in January, 1953 for 60 guineas. To what rate of compound interest was this appreciation equivalent?

(b) The rateable value of a city is £100,000. If the rates for a certain year are 15s. 6d. in the pound, what is the total amount that should be collected in rates in that year?

The City Accountant estimates that an extra £6,200 will be needed in the next year. Find to the nearest penny what the new rate should be if the rateable value remains unaltered.

2. Fig. 1 represents the vertical section of a bridge over a canal. It has a semi-circular tunnel underneath.

(a) Find the area of the section of the bridge.

(b) If the bridge has a uniform width of 24 feet and the material of which it is constructed weighs 112 lb. per cubic foot, find the weight of the bridge in tons.

(c) Find the cost of whitewashing the curved surface of the tunnel at  $7\frac{1}{2}d.$  per square yard.

[Take  $\pi$  to be  $\frac{22}{7}$ ]

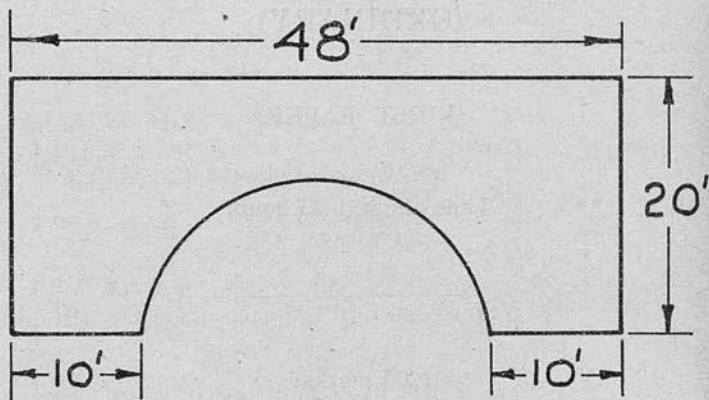


Fig. 1.

3. (a) The equation  $y = ax^2 + bx + c$ , where  $a$ ,  $b$ , and  $c$  are constants, is satisfied when  $x = 1$  and  $y = 2$ , when  $x = 2$  and  $y = 12$ , and when  $x = 3$  and  $y = 28$ . Find the values of  $a$ ,  $b$ , and  $c$ .

Find, also, the values of  $x$  and  $y$  which satisfy this equation and also the equation  $y = 2x + 2$ .

(b) If  $T = 2\pi \sqrt{\frac{l^2 + 3h^2}{3gh}}$ , express  $l$  in terms of the other letters.

4. (a) Fig. 2 represents a wool mat, 3 feet by 1 foot. The inner rectangle is to be light brown in colour, and the border is to be dark brown and is to have a uniform width of  $x$  feet. Show that if the light brown and the dark brown parts are to be of equal area then  $8x^2 - 16x + 3 = 0$ .

Find, correct to two decimal places, the value of  $x$ .

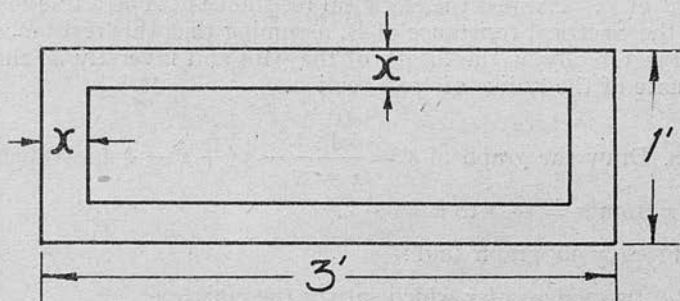


Fig. 2.

(b) If the sum of the roots of the equation  $ax^2 + bx + c = 0$  is twice their difference, find the relation between  $a$ ,  $b$ , and  $c$ . If the smaller root of the quadratic equation is 2, find the equation.

5. (a) Using logarithms, evaluate :—

$$\frac{44.86 \times \sqrt{0.8143}}{(9.023)^3}$$

(b) If  $y = \log_2 x$ , find the values of  $y$  corresponding to  $x = 8, 4\sqrt{2}, 4, 2\sqrt{2}, 2, 1, \frac{1}{2}, \frac{1}{4}$ , and draw the graph of  $\log_2 x$ .

6. (a) A contractor offers to dig a well 30 feet deep, and to charge five shillings for digging the first foot, five shillings and sixpence for digging the second foot, and an additional sixpence for each subsequent foot. What should he charge for digging the well?

(b) The third term of a geometric series is 8.1, and the fifth term is 6.561. Find the first term and the sum to infinity of this series.

[OVER

7. (a) When the expression  $x^3 + ax^2 + bx + 6$  is divided by  $(x + 1)$  the remainder is 8, and when divided by  $(x + 2)$  the remainder is zero. Calculate  $a$  and  $b$ , and then factorise the expression.

(b) A and B are two uniform wires made of the same material and both of circular cross section. The length of A is  $\frac{2}{5}$  that of B and the cross-sectional radius of A is 1.1 times that of B. Express the electrical resistance of A as a fraction of the electrical resistance of B, assuming that this resistance varies directly as the length of the wire and inversely as the square of the radius of cross-section.

8. Draw the graph of  $y = \frac{45}{x+6} - x^2 + x - 4$  for values of  $x$  from  $x = -3$  to  $x = +2$ .

From your graph find:—

(a) two values of  $x$  which satisfy the equation

$$\frac{45}{x+6} - x^2 + x - 4 = 0;$$

(b) two roots of the equation

$$\frac{45}{x+6} - x^2 + x - 6 = 0;$$

(c) the value of  $x$  which makes  $y$  a maximum.

MINISTRY OF EDUCATION FOR  
NORTHERN IRELAND

GRAMMAR SCHOOL CERTIFICATE  
EXAMINATIONS, 1953

SENIOR

PHYSICS (Ordinary)

Time allowed—3 hours

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*Answer TWENTY questions **Only** from Part I.*

*Answer FIVE questions from Part II, not more than TWO being  
chosen from any one Section.*

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PART I  
(80 marks)

*TWENTY questions **Only** should be answered.*

Answer these questions in the separate booklet provided.



## PART II

(160 marks)

Answer FIVE questions, not more than Two being chosen from any one Section.

All questions carry equal marks.

## SECTION A

31. A body is held in equilibrium on a smooth inclined plane by a force  $F$ , acting parallel to the plane. Describe an experiment to show that  $F$  is proportional to  $\sin \theta$ , where  $\theta$  is the angle the plane makes with the horizontal.

A load of 5 lb. is *slowly* drawn 2 ft. up a rough plane, inclined at an angle of  $30^\circ$  to the horizontal, by a force of 3 lb. wt. parallel to the plane. Calculate (a) the total work done, (b) the work done against gravity, and (c) the work done against friction.

32. Explain the *principle* of a method of measuring  $g$ , the acceleration due to gravity. Experimental detail is not required.

A mass of 100 gm. falls freely under gravity from rest. Calculate (a) the distance it falls in 3 sec., (b) its velocity at the end of this fall, and (c) its kinetic energy, then, in ergs.

[Take  $g = 980 \text{ cm/sec.}^2$ ]

33. Describe a measurement of the apparent coefficient of expansion of a liquid (in glass) by a method involving weighings. Explain how you calculate the result or, if you use a formula, derive it.

The density of a liquid measured at  $20^\circ \text{C.}$  is  $0.800 \text{ gm/c.c.}$  What is its density at  $0^\circ \text{C.}$  if its coefficient of expansion is  $8 \times 10^{-4}$  per  $0^\circ \text{C.}$  ?

34. A simple mercury barometer is set up and a volatile liquid is introduced drop by drop into the tube by means of a bent pipette. Describe carefully what happens. How would you measure the saturation vapour pressure of the liquid at the temperature of the experiment ?

How could you develop the experiment to obtain a set of values for the saturation vapour pressure of the liquid at various temperatures and to measure its boiling point under atmospheric pressure ?

## SECTION B

35. A convex lens and a convex mirror are set up on the same axis. Show by a diagram how the image of a luminous point on the axis, formed by refractions and reflection, can coincide with the point.

If the luminous point is 50 cm. from the lens, the distance between lens and mirror is 10 cm. and the radius of curvature of the mirror is 40 cm., determine the focal length of the lens.

If the convex mirror is removed and a plane mirror placed normal to the axis and 50 cm. behind the lens, calculate the position of the final image.

36. List, in order, the adjustments to the telescope and collimator of a spectrometer so that light from a point of the slit enters the telescope as a parallel beam and is focused in the plane of the cross-wires.

Briefly explain how an angle of a glass prism is measured using a spectrometer.

37. Show on a diagram the angle of deviation of a ray of light passing through a triangular glass prism. When is this angle a minimum?

Make a geometrical construction of the path of a minimum-deviated ray through an equilateral glass prism, taking the refractive index of the glass as  $3/2$ . Measure the angle of minimum deviation and compare it with its value as calculated.

38. Describe how the velocity of sound in air may be measured (a) in the open air, and (b) in the air of a tube.

## SECTION C

39. Describe in detail how you would determine experimentally how the magnetic field at the centre of a circular coil varies as (a) the current flowing, (b) the radius of the coil, and (c) the number of turns on the coil.

40. Draw a diagram of a potentiometer circuit as used to compare the E.M.F.s of a Daniell and a Leclanché cell.

The wire of a potentiometer is 4 metres long and its resistance is 20 ohms. It is connected in series with a resistance of 10 ohms and an accumulator, E.M.F. 2 volts and negligible resistance. Over what length of the wire will the potential drop balance an E.M.F. of 1.10 volts?

(OVER)

41. Using a copper voltameter and a resistance coil of known value how would you check the accuracy of a reading of a voltmeter? The electrochemical equivalent of copper is given.

Explain the ionic movements and reactions at the electrodes of the voltameter which take place during the experiment.

42. Write short accounts of *two* of the following :—

- (a) Cathode rays and X-rays.
- (b) The construction, operation and use of a diode valve.
- (c) The transmission of electric power over long distances.

Enter here your Examination Number

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MINISTRY OF EDUCATION FOR NORTHERN IRELAND

GRAMMAR SCHOOL CERTIFICATE EXAMINATIONS, 1953

SENIOR

PHYSICS (Ordinary)

Time allowed—3 hours

Place this booklet in your answer book before handing it in to the Superintendent.

**PART I**

(80 marks)

*Twenty questions only should be answered.*

*It is suggested that not more than one hour should be spent on this Part.*

*All questions carry equal marks.*

[36a]

Do not write in  
this column.

Pt. I

31.....

32.....

33.....

34.....

35.....

36.....

37.....

38.....

39.....

40.....

41.....

42.....

Total

[OVER]

1. When three non-parallel coplanar forces keep a body in equilibrium

(a) their lines of action must .....

(b) they can be represented by .....

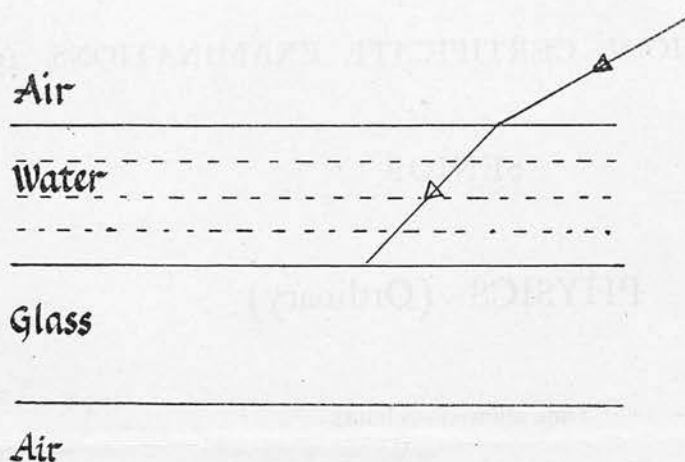
Complete the sentences (a) and (b).

2. Fill in the numbers of degrees Fahrenheit and degrees absolute gas scale ( $^{\circ}\text{K.}$ ) in the following :—

$100^{\circ}\text{C.} = \quad \quad \quad ^{\circ}\text{F.} = \quad \quad \quad ^{\circ}\text{K.}$

$-100^{\circ}\text{C.} = \quad \quad \quad ^{\circ}\text{F.} = \quad \quad \quad ^{\circ}\text{K.}$

3.



The diagram partly represents a light-ray passing from air through layers of water and glass and into air. Draw the approximate path of the ray through the glass and into air again.

4.



$\otimes$  represents a section of a wire carrying current flowing *into* the plane of the paper. Draw three magnetic lines of force due to the current and mark their directions with arrow-heads.



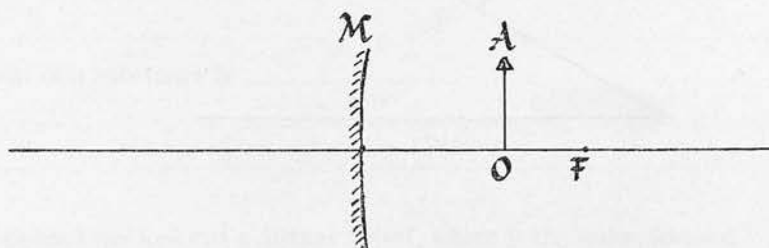
5. What is a couple ? .....
- .....
- .....

The moment of a couple is.....

.....

.....

6.



F is the principal focus of the concave mirror M. Construct a ray diagram to give the image of the object AO.

7. Draw a diagram of an electrical circuit needed to show that the current in a resistance coil is proportional to the potential difference between its terminals.

[OVER

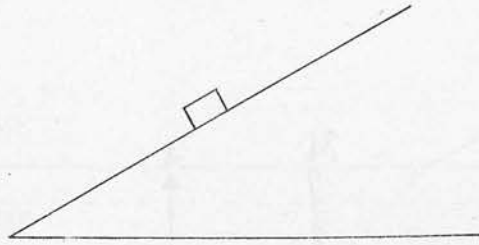
8. The velocity of sound in air at  $0^{\circ}\text{C}$ . is about 33 metres/sec. ; 330 metres/sec. ; 3,300 metres/sec. ; 33,000 metres/sec.

Underline the correct figure.

Sound travels faster in water than in air.

Correct or incorrect ? .....

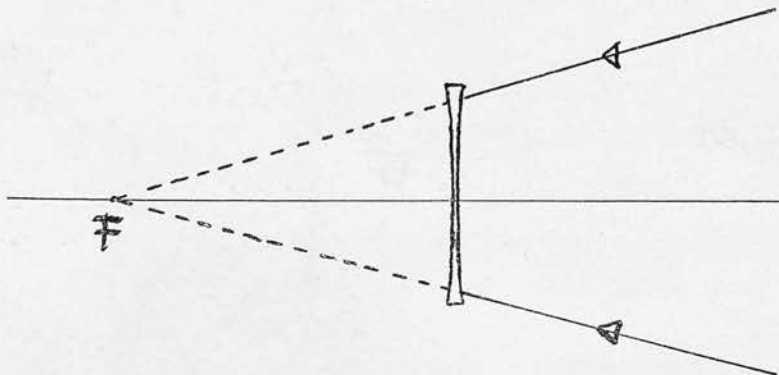
9.



The diagram shows a body at rest on a rough inclined plane. Show the forces acting on the body.

10. A quantity of gas is enclosed in a sealed vessel and heated. If the pressure is 15 lb/sq. in. at  $27^{\circ}\text{C}$ ., at what temperature in  $^{\circ}\text{C}$ . will the pressure be 30 lb/sq. in., assuming that the volume of the vessel does not change ? .....

11.



A pencil of light rays is converging towards the principal focus F of the concave lens. Show the paths of the two rays after passing through the lens.

12. When a lead-acid accumulator is fully charged, the positive plates are coated with.....

When the cell is completely discharged both sets of plates are coated with.....

13. A mass of 5 lb. is acted on by a force of 5 lb. wt. Its acceleration is.....

How far does it move from rest in 1 sec. ?.....

[Take  $g = 32 \text{ ft/sec.}^2$ ]

14. A calorie is.....

The specific heat of a substance is.....

15. When a short-sighted eye looks at a distant object, where is the image focused ?.....

How is short-sight corrected ?.....

16. The power of a lamp is 100 watts when on a 220-volt supply.

The energy consumed per second is .....

The resistance of the filament is.....

17. When a mass of 100 gm. moves with a velocity of 10 cm/sec.,

its momentum is .....

its kinetic energy is .....

18. Air is rapidly bubbled through some ether in a beaker.

The temperature of the ether falls because.....

A mist forms on the outside of the beaker because.....

19. Write T for true or F for false after the following :—

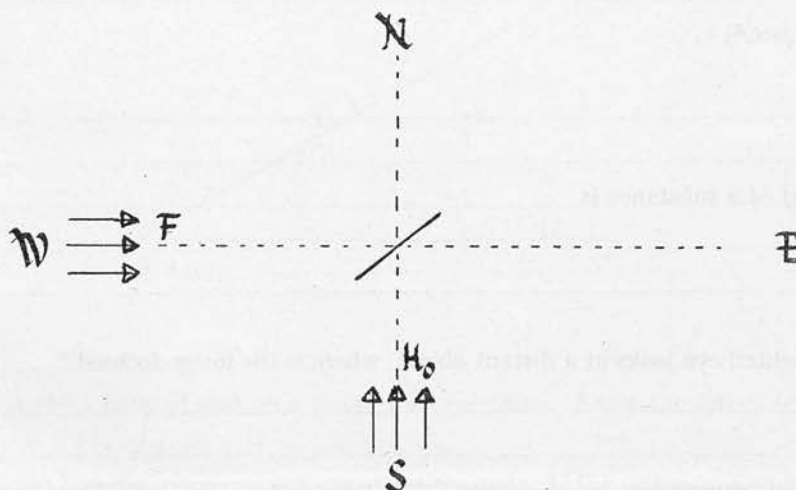
Blue light is more refracted by glass than red light .....

Ultra-violet light will not affect a photographic plate .....

Infra-red rays are visible to the eye .....

Red light is completely absorbed by red glass.....

20.



The diagram shows the magnet, pole-strength  $m$ , of a magnetometer deflected from the N.-S. position by a magnetic field  $F$  acting E.-W. Mark on the diagram the forces acting on the magnet.

21. A force does work when .....

How much work is done against gravity when a mass  $m$  is moved a distance  $d$  along a horizontal surface ? .....

22. Two similar thermometers, one with its bulb blackened, are suspended side-by-side in direct sunlight.

Describe and explain what you would expect to observe. ....

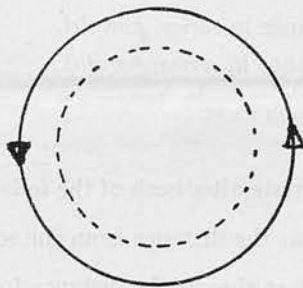
23. A room is lit by three electric lamps connected in parallel. There are *two* switches so that one, two or three lamps may be lighting at the same time. Draw a diagram of the circuit.

24. A standing wave is set up in a string, 150 cm. long, fixed at both ends. The string divides into three vibrating segments.

How many nodes are there ? .....

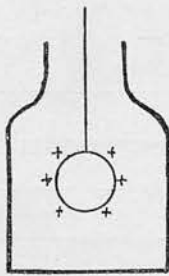
What is the wave-length of the vibration ? .....

25.



The full line circle above represents a coil of wire carrying a current as marked by the arrow-heads. The dotted line represents another coil inside it. Mark by arrow-heads on the inner coil the direction of the current induced in it, when the circuit of the outer coil is broken.

26.



(a)



(b)

Mark on sketch (a) the induced charge on the metal container due to the positively charged sphere suspended inside it.

If the sphere touches the inside of the container and is then withdrawn, mark on (b) the resulting charge on the container.



27. When is an optical image said to be a *virtual* image ? .....

.....

.....

.....

Make a ray diagram showing *one* case of the formation of a virtual image by a lens.

28. A milli-ammeter is to be converted into (a) an ammeter, (b) a voltmeter.

(a) Connect a *low, high*, resistance in *series, parallel*.

(b) Connect a *low, high*, resistance in *series, parallel*.

Strike out the incorrect words in each case.

29. Write *correct* or *incorrect* as appropriate after each of the following :—

The frequency of a note decreases as the distance from the source increases.....

The amplitude of a sound wave diminishes as the distance from the source increases.....

High-pitched notes travel faster than low-pitched ones.....

Sound travels faster in warm than in cold air.....

30. State the meaning of the following terms used in electrolysis :—

The electrolyte is .....

.....

The cathode is .....

.....

An ion is.....

.....

At which electrode is hydrogen evolved during the electrolysis of water ? .....

MINISTRY OF EDUCATION FOR  
NORTHERN IRELAND

GRAMMAR SCHOOL CERTIFICATE  
EXAMINATIONS, 1953

SENIOR

CHEMISTRY (Ordinary)

Time allowed—3 hours

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*Answer ALL questions in Part I.*

*Answer FIVE questions from Part II, not more than Two being  
chosen from any one Section.*

---

PART I

(95 marks)

*ALL questions should be answered.*

1.-14. *Answer these questions in the separate booklet provided.*

## PART II

(145 marks)

*Answer FIVE questions, not more than Two being chosen from any one Section.*

*Additional credit will be given for equations where appropriate.*

*All questions carry equal marks.*

## SECTION A

15. Name the three primary particles of which, it is believed, the atoms of elements are composed. If the atom of hydrogen is assumed to have an approximate mass of 1 unit, give the approximate masses and the charges of the three particles.

How many of each of these particles would be contained in (a) an atom with atomic number 8 and mass number 16, (b) an atom with atomic number 13 and mass number 27? Which of the particles would be present in the nucleus and which of them would occur outside it? Name the atoms.

16. What is the principal distinction between a metallic conductor of electricity and an electrolyte? Mention *one* example of each of the following: (a) metallic conductor; (b) weak electrolyte; (c) strong electrolyte; (d) non-electrolyte.

What substances are liberated at the electrodes when (i) hydrochloric acid solution is electrolysed using carbon electrodes, (ii) sodium chloride solution is electrolysed using carbon electrodes, (iii) copper sulphate solution is electrolysed using copper electrodes?

Give *two* examples of the use of electroplating, and state a reason for this treatment.

17. Define the term *equivalent weight*. What do you understand by the gram-equivalent weight of (a) an acid, (b) a base, (c) an oxidising agent, when used in titrimetric (volumetric) analysis?

Calculate, showing clearly each step in your calculations, the normality of (i) a solution containing 45 g. of sulphuric acid per litre, (ii) a solution containing 60 g. of potassium hydroxide per litre, (iii) a solution containing 3 g. of potassium permanganate per litre for use as an oxidising agent in acid solution. [H = 1, O = 16, S = 32, K = 39, Mn = 55.]

18. State Dulong and Petit's Law of atomic heats.

When 5 g. of a metal, X, were added to a solution of copper sulphate, 2.83 g. of copper were displaced. The specific heat of X was found to be 0.055. Calculate the atomic weight of the element. Give the formula and the molecular weight of the compound that it would form with chlorine.

[Cl = 35.5 ; Cu = 63.5.]

### SECTION B

19. Write notes on the general properties of the alkali metals in respect of (a) electronic structure, (b) usual valency, (c) physical properties of the elements, (d) chemical properties of the elements. Reference to individual elements is not required.

State briefly, with equations, how you would prepare specimens of (i) sodium bisulphate, (ii) sodium sulphite.

20. Name *one* important ore of copper. Describe briefly the purification of the crude metal in order to obtain a highly pure sample. Name the principal constituents of *two* important copper alloys, and mention *two* other uses of copper as a metal. Mention a use for *one* compound of copper.

Distinguish between the *cuprous* and the *cupric* series of compounds, and give *one* example of each type of compound.

Give an equation for the reaction of ammonia solution (not in excess) with a cupric sulphate solution. Describe briefly the phenomena which you would observe if ammonia solution was slowly added to the cupric solution until the ammonia was present in considerable excess. How do you explain the observed behaviour?

21. Describe a laboratory preparation of chlorine gas, illustrating your answer by means of a sketch of the apparatus, suitably labelled.

How does chlorine react with *three* of the following : hydrogen sulphide ; zinc ; iron ; cold dilute sodium hydroxide solution ; potassium bromide solution ?

Mention *three* uses for chlorine.

22. How can quicklime be prepared from limestone, and how in turn can it be converted into slaked lime? Show by equations the relation between the three compounds.

How is calcium carbide manufactured? Mention an important use for this compound.

Show by equations the use of (a) marble in the preparation of carbon dioxide, (b) lime water as a test for carbon dioxide.

[OVER

## SECTION C

23. Write a general formula for (a) a paraffin, (b) an olefine. State briefly how olefines may be produced industrially.

Mention three reactions characteristic of olefines, and illustrate these by equations showing the behaviour of ethylene. How would ethane behave if treated with the same reagents?

Outline *one* laboratory method for the preparation of ethylene from ethyl alcohol.

24. A compound,  $A$ ,  $C_3H_8O$ , on treatment with phosphorus pentachloride, is converted into  $B$ ,  $C_3H_7Cl$ .  $B$  can be reconverted into  $A$  by the action of aqueous caustic potash solution. On treatment with concentrated sulphuric acid,  $A$  is converted into  $C$ ,  $C_3H_6$ , which, when mixed with hydrogen and passed over finely divided nickel at  $200^\circ C$ ., is converted into propane. With acetic acid,  $A$  reacts to give  $D$ ,  $C_5H_{10}O_2$ , and with sodium metal  $A$  gives  $E$ ,  $C_3H_7ONa$ .

Draw up a scheme illustrating the series of reactions described, and giving a graphic formula for each of the compounds  $A$ ,  $B$ ,  $C$ ,  $D$  and  $E$ . Balanced equations for the reactions need not be included.

25. Write general structural formulae for (a) ethers, (b) esters, (c) carboxylic acids.

How could acetic acid be prepared from ethyl alcohol, and what type of reaction would this represent? Name the intermediate product which would be formed in the preparation. (Experimental details are not required.)

How would acetic acid react with (i) calcium carbonate, (ii) chlorine, (iii) phosphorus pentachloride? Give equations for these reactions.

26. An organic compound has the percentage composition by weight,  $C = 40.7$ :  $H = 8.5$ :  $O = 27.1$ :  $N = 23.7$ . Its molecular weight is found to be 59. Determine the molecular formula of the compound.

On warming with sodium hydroxide solution the compound is found to react giving off ammonia. Suggest a graphic formula for the substance. To what class does it belong? How would you expect it to react with phosphorus pentoxide?

[ $H = 1$ ,  $C = 12$ ,  $N = 14$ ,  $O = 16$ .]



Enter Here Your Examination Number

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MINISTRY OF EDUCATION FOR NORTHERN IRELAND

GRAMMAR SCHOOL CERTIFICATE EXAMINATIONS, 1953

SENIOR

CHEMISTRY (Ordinary)

Time allowed—3 hours

Place this booklet in your answer book before handing it in to the Superintendent.

**PART I**

(95 marks)

*ALL questions should be answered.*

*It is suggested that not more than one hour should be spent on this Part.*

Do not write in  
this column

**Pt. 1**

15.....

16.....

17.....

18.....

19.....

20.....

21.....

22.....

23.....

24.....

25.....

26.....

**Total**

## 1. State

(a) Gay-Lussac's Law of combining gaseous volumes .....

.....

.....

.....

(b) Avogadro's Hypothesis .....

.....

.....

(c) Graham's Law of Diffusion .....

.....

.....

(d) Boyle's Law .....

.....

.....

## 2. If the following substances will burn in air, write YES. If not, write NO.

(a) Chlorine .....

(b) Copper .....

(c) Hydrogen .....

(d) Magnesium .....

(e) Nitrogen .....

(f) Phosphorus.....

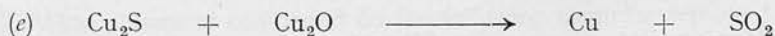
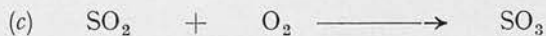
3. Write down the formulae of the following compounds :—

- (a) Ammonia .....
- (b) Ferrous hydroxide .....
- (c) Iodoform .....
- (d) Methane .....
- (e) Methyl alcohol .....
- (f) Nitrous oxide .....
- (g) Zinc nitrate .....

4. Give the names of the following compounds :—

- (a)  $\text{CH}_3 \cdot \text{COOH}$  .....
- (b)  $\text{C}_3\text{H}_8$  .....
- (c)  $\text{C}_2\text{H}_5 \cdot \text{OH}$  .....
- (d)  $\text{C}_2\text{H}_4$  .....
- (e)  $\text{CH}_3 \cdot \text{CN}$  .....

5. Balance the following equations :—



6. Indicate whether the following oxides are (i) acidic, (ii) basic, (iii) neutral, or (iv) amphoteric.

- (a) Aluminium oxide .....
- (b) Calcium oxide .....
- (c) Nitric oxide .....
- (d) Nitrogen dioxide .....
- (e) Phosphorus pentoxide .....
- (f) Zinc oxide .....

7. Complete the following statements by inserting the correct numbers of volumes :—

- (a) 1 volume of hydrogen + 1 volume of chlorine give ..... of hydrogen chloride.
- (b) 1 volume of nitrogen + ..... of hydrogen give 2 volumes of ammonia.
- (c) Sulphur burned in 1 volume of oxygen gives ..... of sulphur dioxide.
- (d) 1 volume of oxygen + ..... of hydrogen give 2 volumes of steam.

8. Arrange the following elements in the correct order in the table, according to the electrochemical series :—Chlorine, copper, hydrogen, silver, sodium, zinc.

*Electropositive*

1. ....
2. ....
3. ....
4. ....
5. ....
6. ....

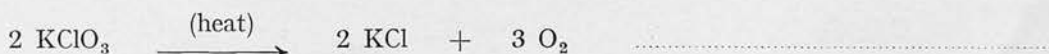
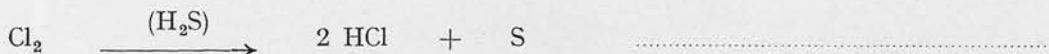
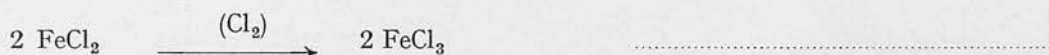
*Electronegative*

9. Insert the following elements in their correct places in the table : Argon, boron, chlorine, hydrogen, lithium, phosphorus, sodium.

<i>Atomic number.</i>	<i>Atomic weight.</i>	<i>Element.</i>
1	1	.....
3	7	.....
5	11	.....
11	23	.....
15	31	.....
17	35.5	.....
18	40	.....

10. Sketch and label the apparatus that you would use for determining the boiling point of a liquid.

11. The following reactions are examples of (i) decomposition, (ii) dissociation, (iii) double decomposition (iv) oxidation, or (v) reduction. State the correct type opposite each reaction.



12. What classes of compound do the following formulae represent ?

(a)  $\text{R.NH}_2$  .....

(b)  $\text{R.COCl}$  .....

(c)  $\text{R.Cl}$  .....

(d)  $\text{R.CHO}$  .....

(e)  $\text{R.CONH}_2$  .....

(f)  $\text{R}_2\text{CO}$  .....

[OVER



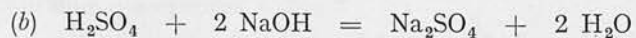
13. Write down structural formulae for all the compounds having the molecular formulae  $C_3H_8O$ , and state the class to which each belongs.

14. Using the given equations, carry out the calculations indicated.



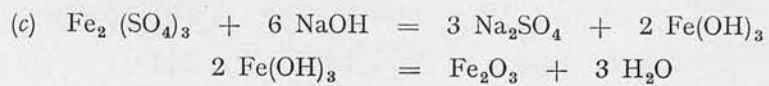
What weight of silver chloride will be produced from 5 g. sodium chloride? [N = 14, O = 16, Na = 23, Cl = 35.5, Ag = 108.]

Ans. ....



What weight of sodium sulphate will be produced from 5 g. sodium hydroxide? [H = 1, O = 16, Na = 23, S = 32.]

Ans. ....



What weight of ferric oxide will be produced from 5 g. ferric sulphate? (H = 1, O = 16, Na = 23, S = 32, Fe = 56.)

Ans. ....

For Examiner's use.

MINISTRY OF EDUCATION FOR  
NORTHERN IRELAND

GRAMMAR SCHOOL CERTIFICATE  
EXAMINATIONS, 1953

SENIOR

GEOGRAPHY (Ordinary)

(FIRST PAPER)

Time allowed—2½ hours

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(200 marks)

*FOUR questions should be answered.*

*Candidates should answer Two questions from Section A, one of which must be Question 1, and Two questions from Section B.*

*Wherever possible, answers should be illustrated by sketch maps and diagrams.*

*All questions carry equal marks.*

SECTION A

1. Study the Ordnance Survey map provided and answer the following questions :—

- (a) Write an account of the relief of the area.
- (b) Describe the drainage of the area.
- (c) Enumerate the probable occupations of the people living in the area and give reasons for your answer. Show the connection between any *two* of the occupations noted.
- (d) Comment on and account for the position of the villages of Bonby, Saxby All Saints and Hockstow.
- (e) Describe the means of communication in the area.

2. Study the three photographs provided and answer *briefly* the following questions :—

*Photograph I.*

- I (a). What are the large rectangular water areas shown in the photograph ?
- I (b). What is the purpose of the water areas named under I (a) ?
- I (c). What are the small craft alongside the two large ships on the left ?
- I (d). What are the long buildings near most of the ships ?
- I (e). Describe, very briefly, the course of the main river.
- I (f). A small part of a British port is shown. Which port do you think this is ?
- I (g). Give *one* reason for your answer under I (f).

*Photograph II.*

- II (a). What crop is grown on the hillside in the foreground ?
- II (b). Why is this crop grown on the higher ground ?
- II (c). Why are the tops of the plants being picked ?
- II (d). What is the crop grown on the plain in the middle distance ?
- II (e). What is the purpose of the low earth walls around each field on the plain ?
- II (f). What type of cultivation can be seen on the hillsides in the right middle distance ?
- II (g). Why does the road in the middle of the photograph skirt the adjacent hills ?
- II (h). In which country do you consider this photograph was taken ?
- II (i). Give *one* reason for your answer under II (h).

*Photograph III.*

- III (a). There is evidence of two industrial activities in this photograph. Name them.
- III (b). What is the purpose of the large building on the left ?
- III (c). What is the name given to the channel running from the building named under III (b) ?
- III (d). What type of woodland is shown in the photograph ?

3. Describe the various instruments you would use to obtain (a) average annual rainfall, (b) average monthly temperatures, and (c) daily variations in atmospheric pressure.

4. "In making a study of your own neighbourhood, first-hand observation is essential." Mention the geographical factors you would observe and describe the form in which your observations would be recorded.

### SECTION B

5. Quoting specific examples from the British Isles, describe the land forms resulting from the destructive action of ice.

6. Write notes on the following :—

- (a) Drumlins.
- (b) Intermittent drainage.
- (c) Rias.
- (d) Ox bow lakes.
- (e) Incised meanders.

7. Describe the various stages in the development of a depression, emphasizing the weather conditions associated with each stage.

8. Describe in detail the climate, natural vegetation and human occupations of *either* (a) the Tundra of Eurasia *or* (b) the Amazon Valley.

9. Giving *one* example in each case, explain fully what is meant by *five* of the following :—(a) monoculture, (b) geographical inertia, (c) land reclamation, (d) federal capital, (e) submarine or undersea coalfield, (f) fishing ground, (g) oasis.

10. Describe the world distribution of the lumbering industry.



MINISTRY OF EDUCATION FOR  
NORTHERN IRELAND

GRAMMAR SCHOOL CERTIFICATE  
EXAMINATIONS, 1953

SENIOR

GEOGRAPHY (Ordinary)

(SECOND PAPER)

Time allowed—2 hours

---

(200 marks)

FOUR questions should be answered.

*Candidates should answer ONE question from Section A, ONE question from Section B and ONE question from Section C, the fourth question being chosen from either Section A, B or C.*

*Wherever possible, answers should be illustrated by sketch maps and diagrams.*

*All questions carry equal marks.*

SECTION A

1. *Either (a)* Outline the geographical factors which have influenced the growth of the linen industry in Northern Ireland. Describe the distribution of the industry and indicate the main sources of the raw material.

*Or (b)* What is a market town? Discuss the distribution of the chief market towns in Northern Ireland (Political Unit).

2. What factors have aided the successful development of *three* of the following :—the beet sugar industry at Carlow ; tobacco manufacture at Bristol ; oil refining at Fawley ; the jute industry of Dundee ; the Kentish paper industry ; the engineering industry of Cork ; shipbuilding at Birkenhead ; pottery manufacture at Stoke-on-Trent ?

3. Give a geographical description of *one* of the following :—

- (a) The Scottish Highlands.
- (b) The Lake District, including the Cumberland Coalfield.
- (c) The Severn Valley.
- (d) The North and South Downs and the Weald.

4. Discuss the distribution of dairy farming throughout the British Isles. Add a brief note on recent trends in this distribution.

## SECTION B

5. Describe the relief, drainage, climate, occupations and towns of *one* of the following :—Holland ; Sweden ; the Basin of Aquitaine *and* the Central Plateau of France.

6. Write a geographical account of *two* of the following :—the Swiss Plateau ; the Peninsula of Jutland ; the Rift Valley of the Rhine ; the Meseta.

7. Describe the physical features, climate and economic development of *either* Newfoundland *or* the Prairie Provinces of Canada.

8. Write notes on *three* of the following :—

- (a) The Colorado Canyons.
- (b) Fruit growing in California.
- (c) The Fall Line District.
- (d) The Metal Industry of Birmingham, Alabama.
- (e) The Lake Superior iron ore deposits.
- (f) The Tennessee Valley Authority.

## SECTION C

9. Describe the physical features, climate and economic development of *one* of the following :—

- (a) The Murray-Darling Basin.
- (b) The Nile Valley.
- (c) Burma.

10. *Either* (a) On the accompanying map of India, Pakistan, Ceylon and Burma :—

- (i) Name the five towns marked.
- (ii) Name the three rivers numbered (1), (2) and (3), and the mountains marked (4) and (5).
- (iii) On the map mark one area producing each of the following commodities :—wheat (W), teak (T), oil seeds (O.S.), sugar (S) and millet (M).
- (iv) Shade distinctively one area with a mean annual rainfall over 80 inches and the area with a July temperature over 90° F.
- (v) Mark and name the Sundarbans and the Sukkur Dām.
- (vi) The main cotton-growing area of India is shown on the map. Give the reasons for this distribution of the crop.

(The answer to 10 (a) (vi) must be written in your *answer book*.)

Or (b) On the accompanying map of Australia :—

- (i) Name the five towns marked.
- (ii) Name the river numbered (1), the mountains numbered (2) and (3), the lake numbered (4) and the peninsula numbered (5).
- (iii) On the map mark one area producing each of the following commodities :—coal (C), cotton (CN), fruit (F), dairy produce (DP), and timber (T).
- (iv) Shade distinctively one area with an annual rainfall over 60 inches and one area with a January temperature over 90° F.
- (v) Mark and name the Nullarbor Plains and the Gippsland Valley.
- (vi) The main sheep-rearing areas of Australia are shown on the map. Give the reasons for this distribution.

(The answer to 10 (b) (vi) must be written in your *answer book*.)

[OVER

Or (c) On the accompanying map of Africa :—

- (i) Name the five towns marked.
- (ii) Name the three rivers numbered (1), (2) and (3), the mountains marked (4), and the lake marked (5).
- (iii) On the map mark one area producing each of the following commodities :—copper (Cu), maize (M), citrus fruits (CF), sisal hemp (SH) and coffee (C).
- (iv) Shade distinctively the area with an annual rainfall over 60 inches and the area with a July temperature over 90° F.
- (v) Mark and name the Gezira.
- (vi) The main sheep-rearing area in South Africa is shown on the map. Give the reasons for this distribution.  
(The answer to 10 (c) (vi) must be written in your *answer book*.)



MINISTRY OF EDUCATION FOR NORTHERN IRELAND

GRAMMAR SCHOOL CERTIFICATE  
EXAMINATIONS, 1953

SENIOR

GEOGRAPHY (Ordinary)

(FIRST PAPER)

Photograph I

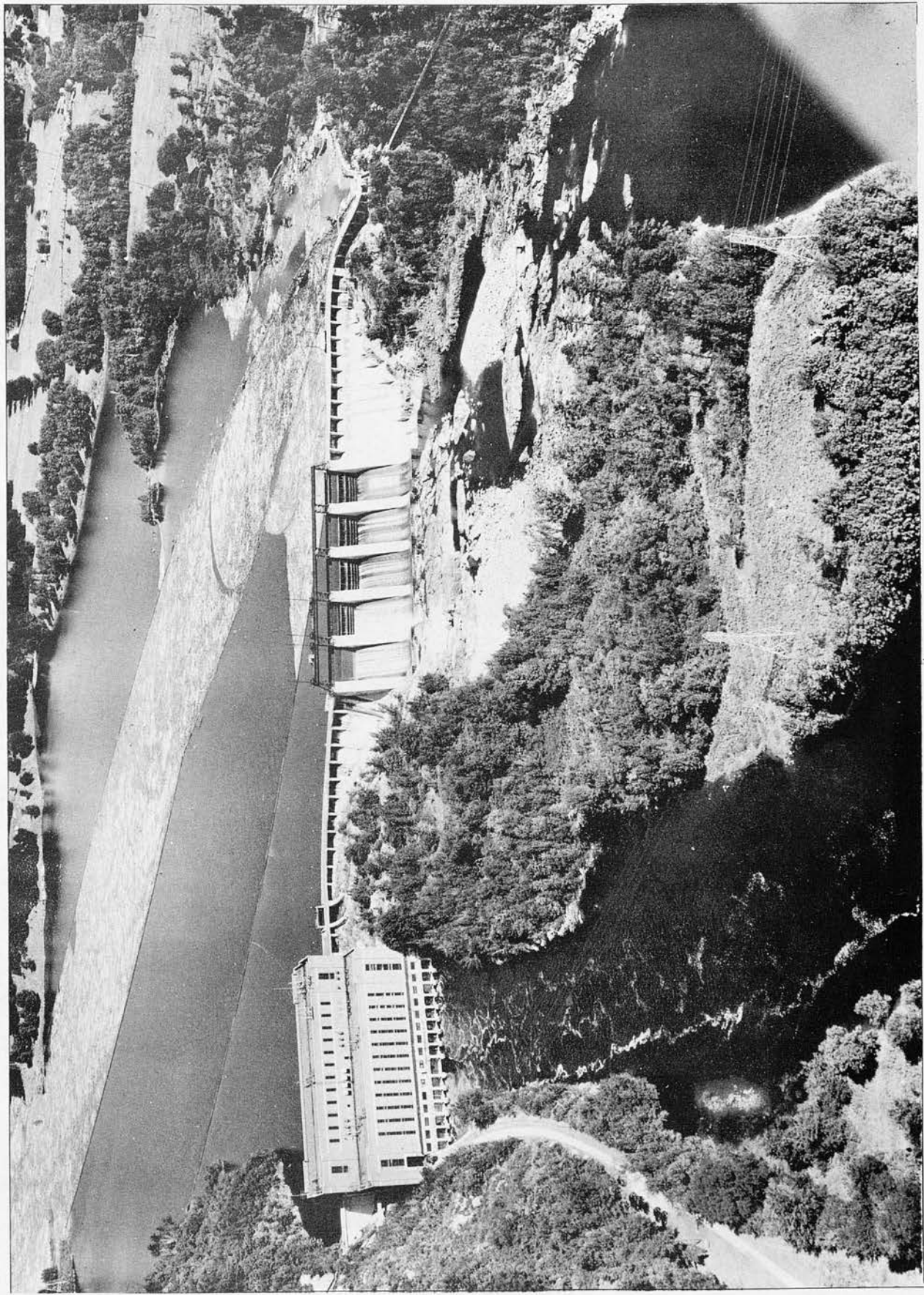


Photograph II





Photograph III



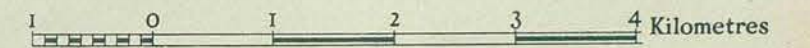
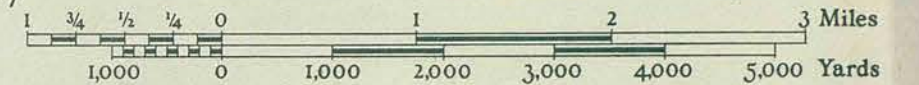


(O.S. Stk. 104)

MINISTRY OF EDUCATION FOR NORTHERN IRELAND.  
GRAMMAR SCHOOL CERTIFICATE EXAMINATIONS, 1953.

SENIOR.  
MAP FOR USE IN GEOGRAPHY (ORDINARY)  
FIRST PAPER.

Scale: One Inch to One Statute Mile =  $\frac{1}{63360}$



### THE NATIONAL GRID

To refer to a particular point:- (1) Read for each half of the reference the double figures printed in large type in the margins, which denote tens of Kilometres and Kilometres. (2) Then, to obtain reading to nearest 100 metres, estimate position of point in tenths from the grid lines, which are 1,000 metres apart.  
THUS TO GIVE A NORMAL NATIONAL GRID REFERENCE ON THIS SHEET

EXAMPLE		Mickleholme	
East	Take west edge of square in which point lies and read the large figures printed opposite this line on north or south margins. Estimate tenths Eastwards	North	Take south edge of square in which point lies and read the large figures printed opposite this line on east or west margins. Estimate tenths Northwards
	95		16
	2		3
	952		163
Reference		952163	

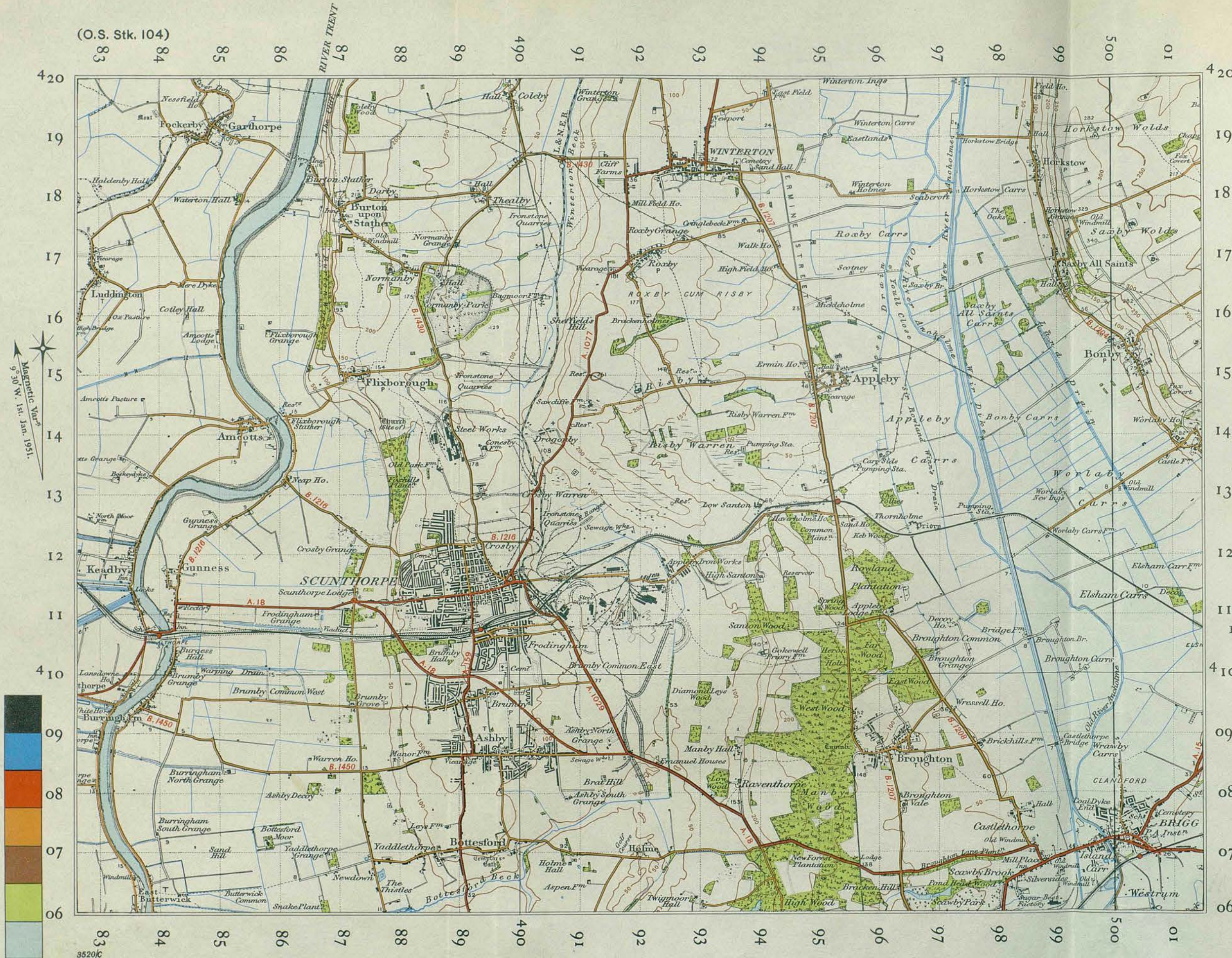
Heights are in feet above Mean Sea Level. Contours are at 50 feet vertical intervals

True North at the West edge of this sheet is  $1^{\circ}00'$  W of Grid North,

Annual change in Magnetic Variation is about  $8'$  E.

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ORDNANCE SURVEY 1951.





MINISTRY OF EDUCATION FOR  
NORTHERN IRELAND

GRAMMAR SCHOOL CERTIFICATE  
EXAMINATIONS, 1953

SENIOR

DOMESTIC SCIENCE

(ORDINARY)

Time allowed—3 hours

---

(200 marks)

*SIX questions should be answered. FOUR of these should be chosen from Section A and the remaining TWO from either Section B or Section C, but not from both.*

*All questions carry equal marks.*

## SECTION A

1. (a) Give definitions of the methods of frying you have used.

(b) Describe the preparation and serving of a supper dish, (main ingredient either cheese or cooked meat) to be cooked by one of the methods given at (a).

2. (a) What are the advantages of fresh raw food in the diet ?

(b) Describe the preparation of the ingredients, and the arrangement, to make an attractive salad to serve as an accompaniment to a savoury dish.

(c) Give recipe and method for a suitable dressing for the salad.

3. (a) Make out a list of cloths and brushes used in the preparation of food, and in the washing up of utensils used for food.

(b) These cloths and brushes are all potential germ carriers. Write a brief description of the care and cleaning of each article in the list at (a) to make it as germ-free as possible.

4. (a) How would you describe a Vegetarian ?

(b) Give menus for a main meal for three days, for a Vegetarian family.

(c) State which Class of Food is likely to be deficient, and which too abundant in vegetarian diet.

5. Give recipe, method and serving of :—

(a) meat soup ;

(b) boiled fish and sauce.

(c) Why are different methods of boiling used ?

6. (a) Make out the order of work for a thorough clean (not spring clean) of a household kitchen.

(b) List four modern labour-saving fittings, or utensils, which minimise the housewife's work in the kitchen.

7. How would you treat :—

(a) a person, who, while chopping wood, has got a splinter at the nail of a finger ;

(b) grit, which cannot be seen in a person's eye, but which is very painful ;

(c) an ankle that has been wrenched and is swelling rapidly ?

*Section B and Section C are alternatives. Candidates must not answer questions from both.*

#### SECTION B

8. (a) How would you repair a child's print dress with a ragged tear in the left front of the bodice? Use diagrams to illustrate your answer.

(b) Suggest various ways in which material for patching may be obtained if the dress was a "ready made."

9. Give directions for making a side opening suitable for knickers or a slip. Use diagrams and show the position of the fastenings to be used, stating those most suitable.

10. Describe how to work the seams to be used on the following :—

(a) a rayon slip ;

(b) a tweed skirt ;

(c) a dress of fine woollen material.

Illustrate your answer with diagrams.

#### SECTION C

11. (a) State cleansing agents suitable for washing woollens.

(b) Using one agent stated at (a) describe the washing and drying of a woollen cardigan with pockets. Give reasons for each process.

(c) Why do woollens, being washed for the first time, often resist the soap and destroy the lather at once? How can this be overcome if the garment is (i) white, (ii) coloured?

12. (a) Give the order of work for the weekly clean of the lavatory, where it is separate from the bathroom.

(b) State the attention necessary to any equipment which is used exclusively for this work.

(c) Name three preparations which are used to "disinfect" the lavatory and describe their action.

13. Give instructions for the repair of *two* of the following :—

(a) a three-cornered tear in a bath towel ;

(b) a hole in a pillowcase ;

(c) a double-bed size sheet which has worn very thin down the centre.

Illustrate your answers with diagrams.



### APPENDIX E.

Diagrams illustrating the oblique rotation of  
axes for factorial analysis in Part I.

# Appendix E : Oblique rotations.

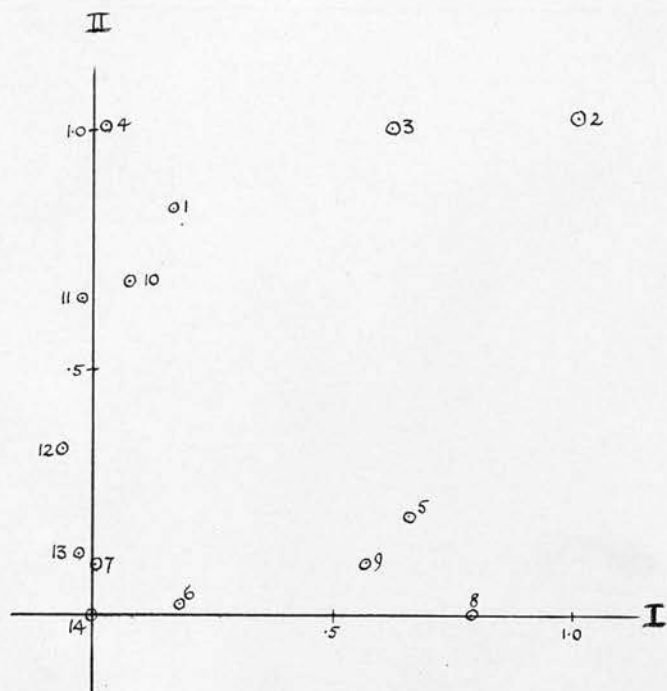


Figure (a) - Boys.

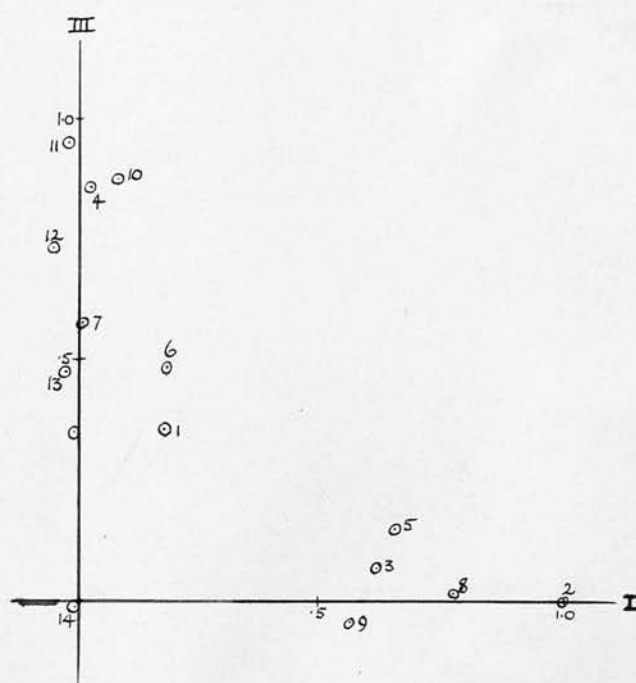


Figure (b) - Boys.

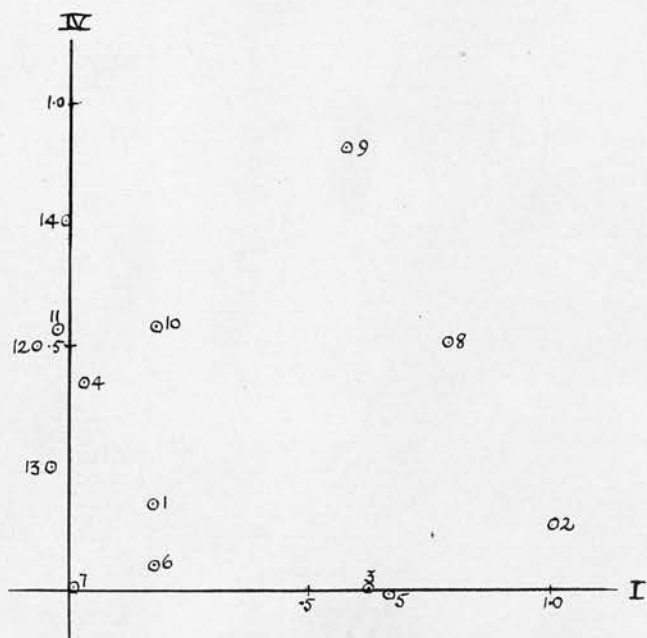


Figure (c) - Boys.

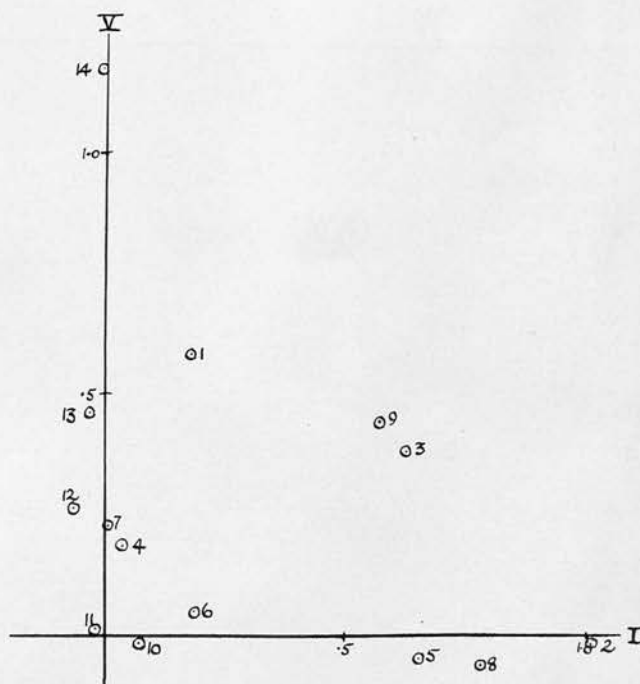


Figure (d) - Boys.

Appendix E : Oblique rotations.

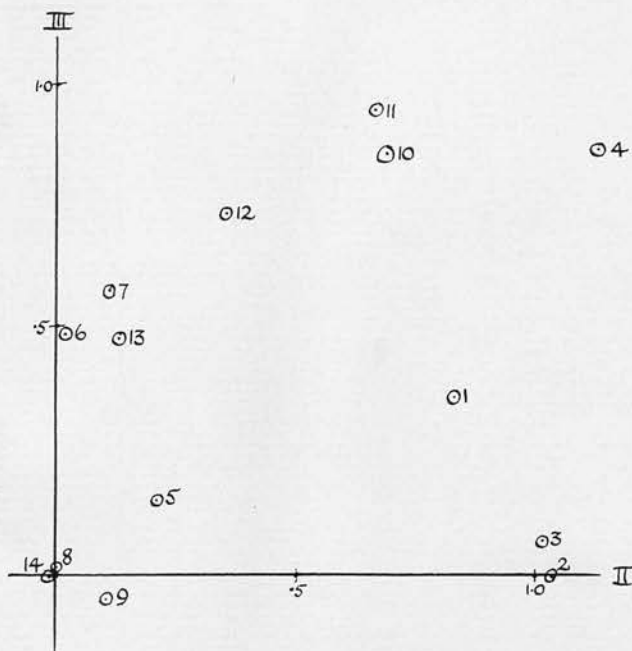


Figure (e.) - Boys.

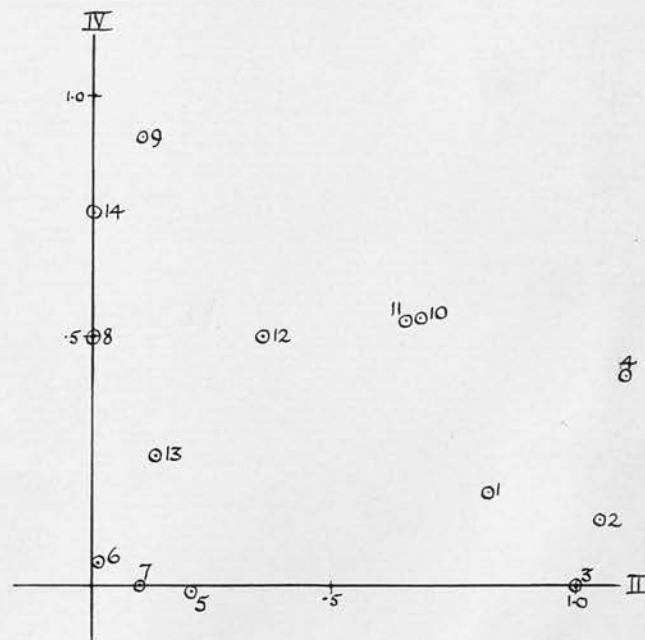


Figure (f.) - Boys.

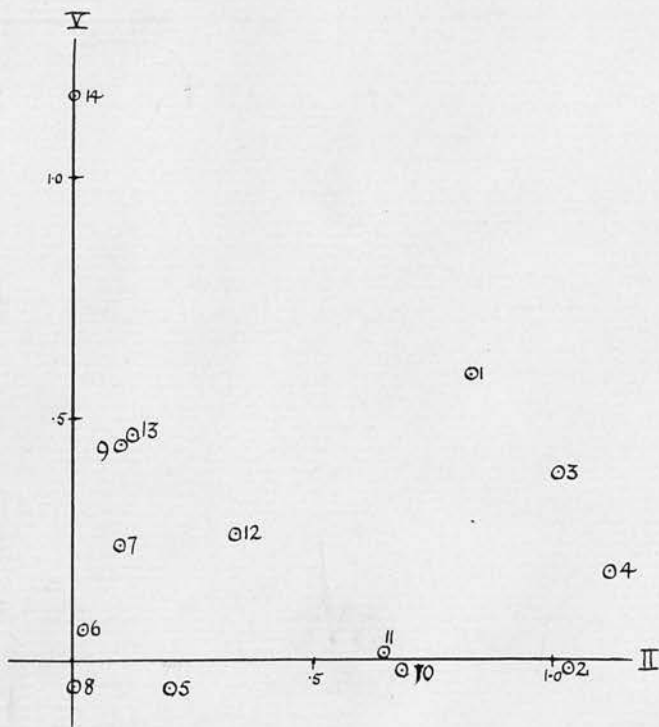


Figure (g.) - Boys.

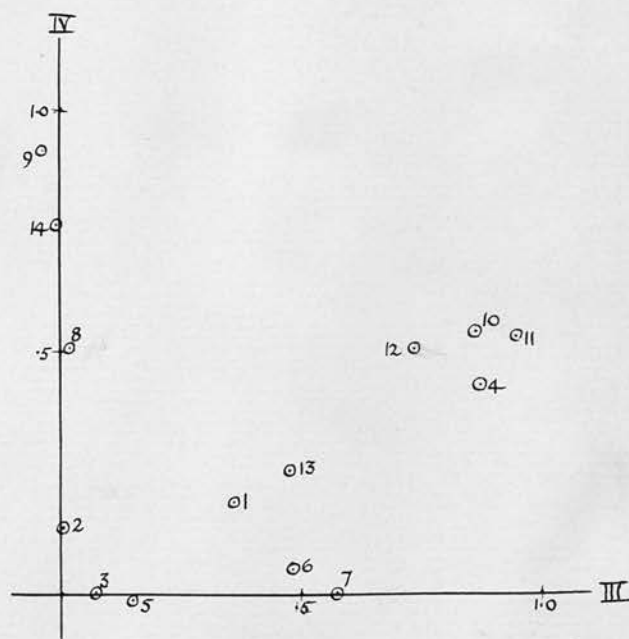


Figure (h.) - Boys.

# Appendix E : Oblique rotations.

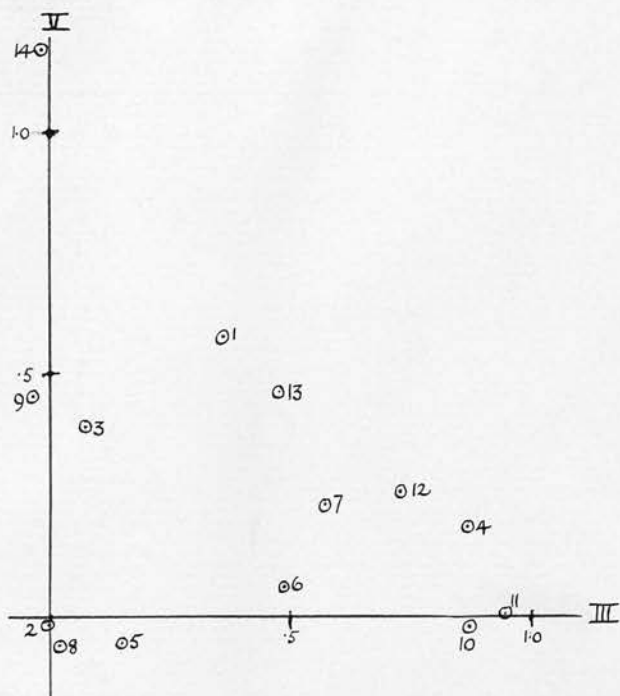


Figure (i.) - Boys.

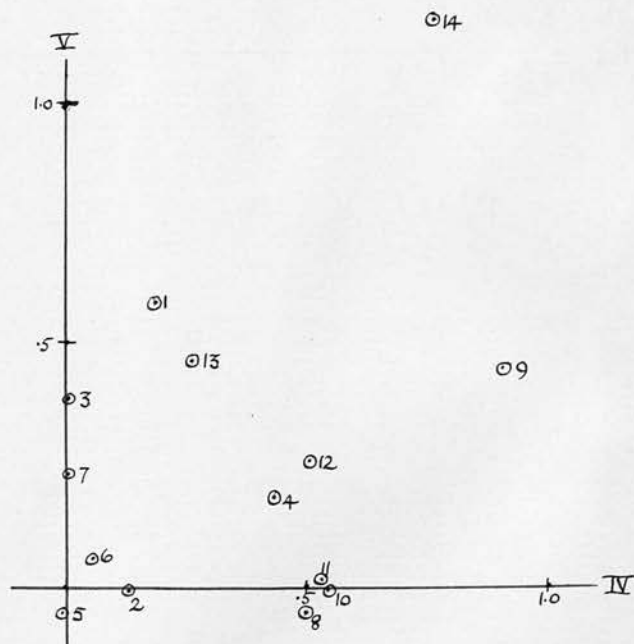


Figure (j.) - Boys.

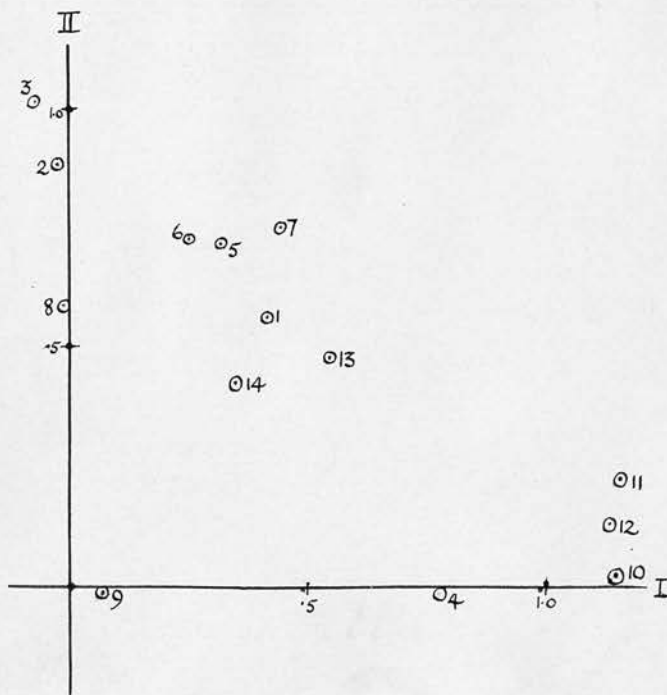


Figure (k.) - Girls.

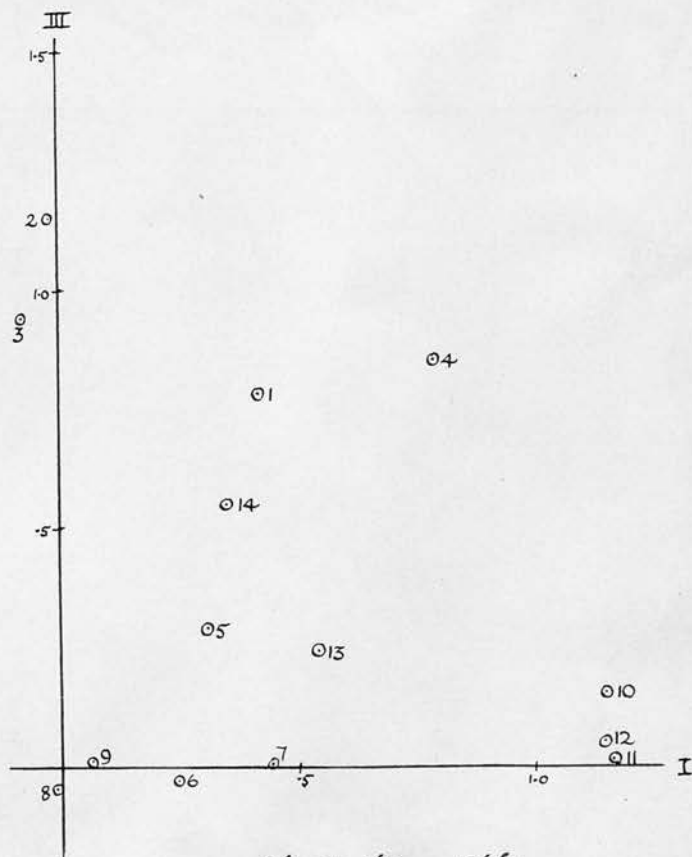
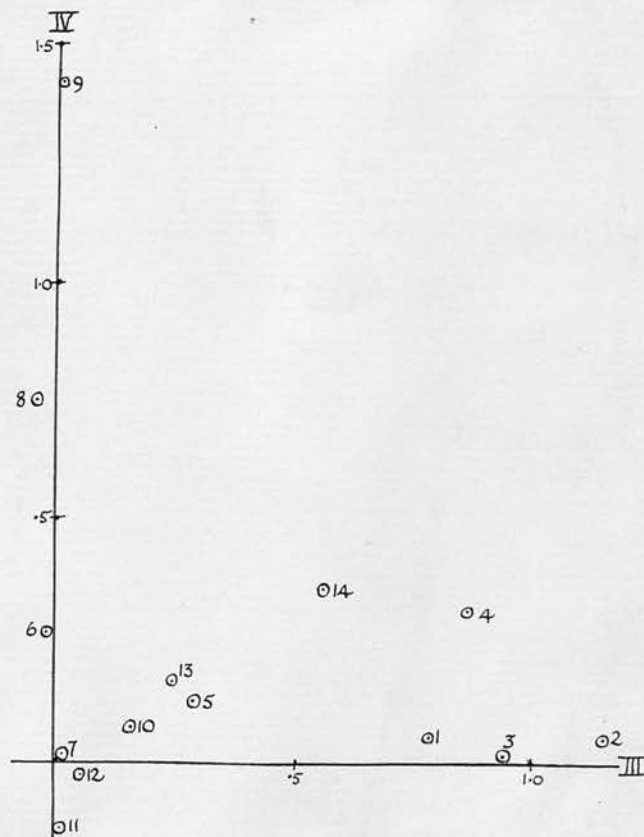
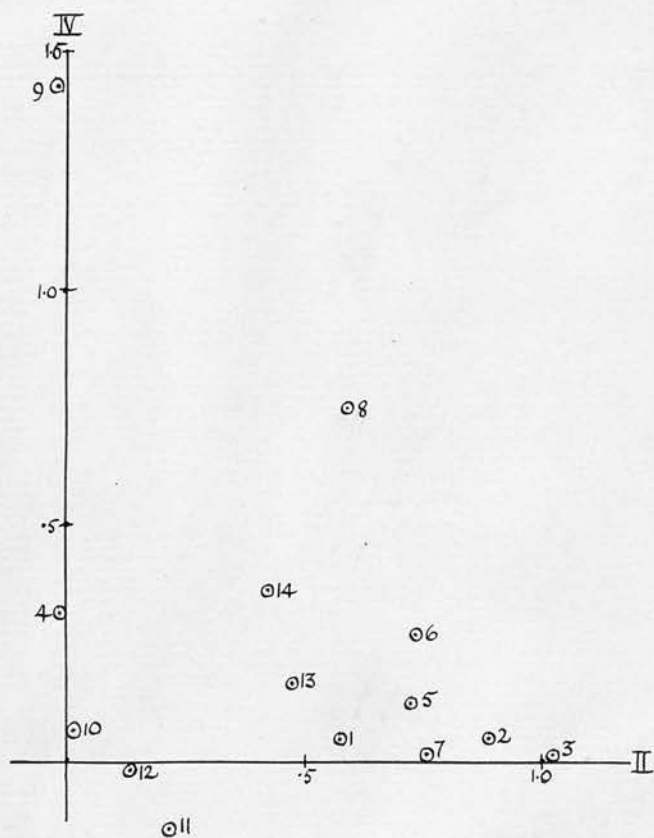
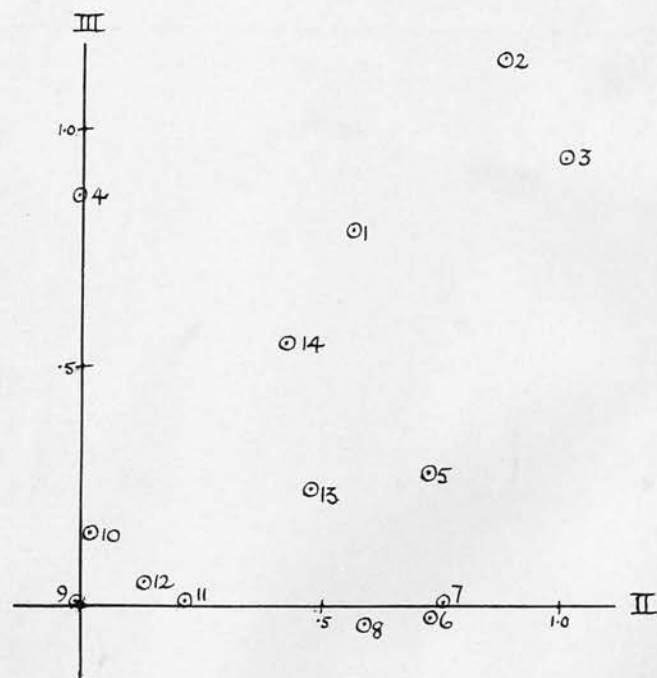
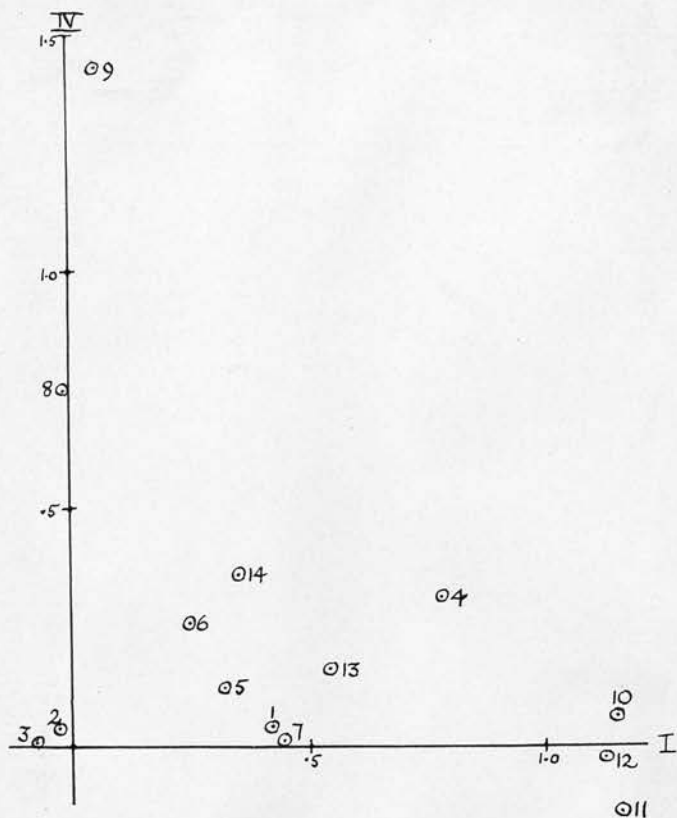


Figure (l.) - Girls.





## APPENDIX F.

Diagrams illustrating the orthogonal rotation  
of axes for factorial analysis in Part II.

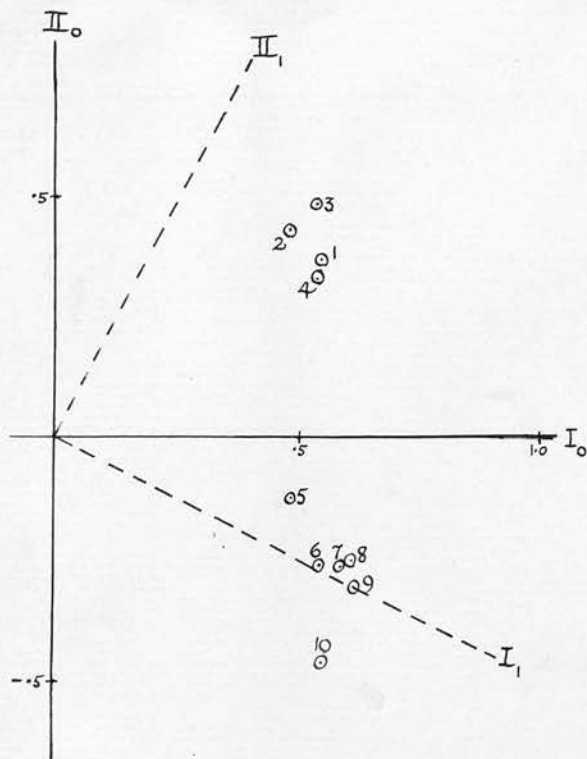


Figure 1. - Boys.

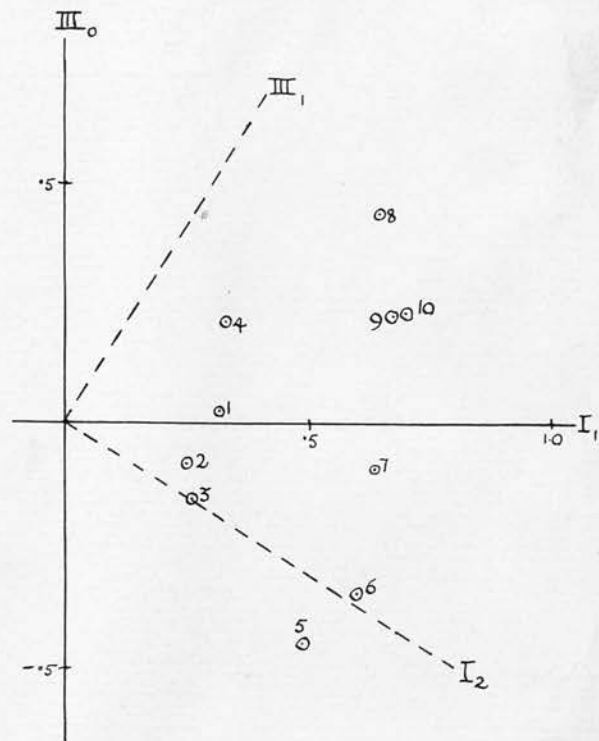


Figure 2. - Boys.

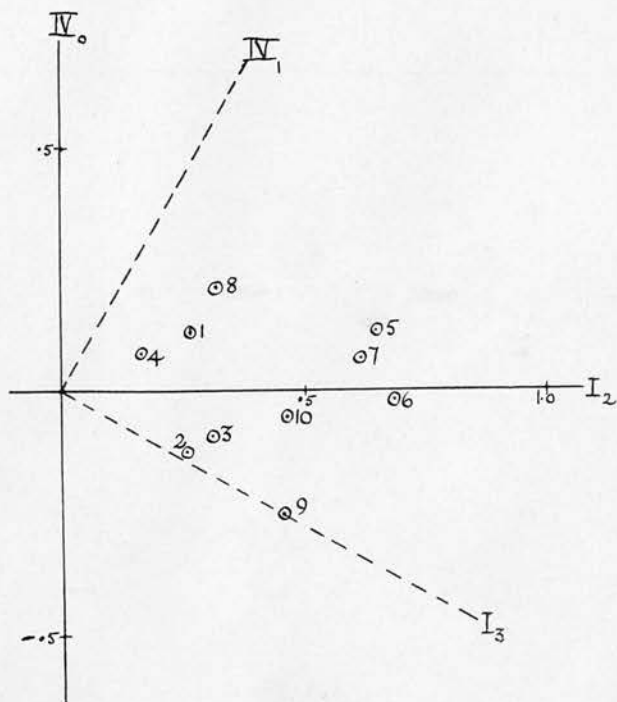


Figure 3. - Boys.

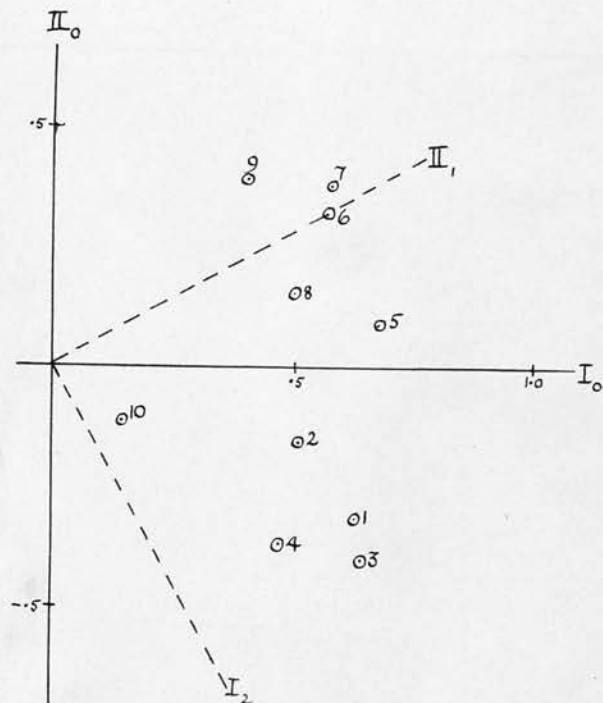


Figure 1. - Girls.

Appendix F : Orthogonal Rotations.

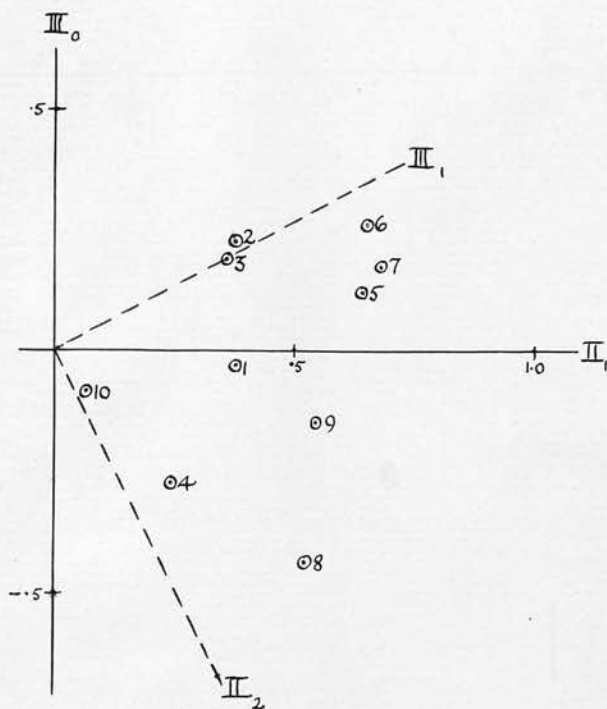


Figure 2. - Girls.

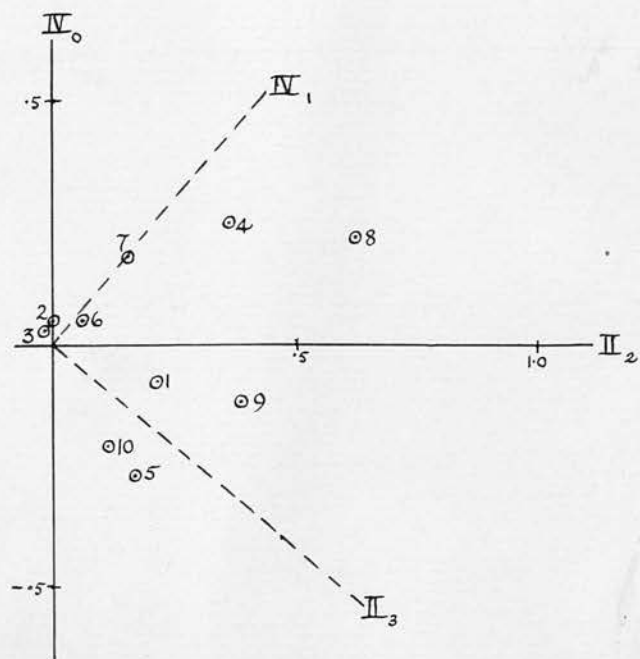


Figure 3. - Girls.